

Magelis

XBT GC

User Manual

09/2009

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

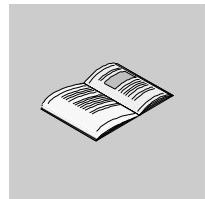
When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

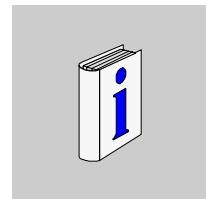
CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This manual describes how to use the Magelis XBT GC devices.

Validity Note

The data and illustrations found in this book are not binding. We reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be construed as a commitment by Schneider Electric.

Related Documents

Title of Documentation	Reference Number
Instruction Sheet XBT GC (multi lingual document)	3501639200

You can download these technical publications and other technical information from our website at www.schneider-electric.com.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.

Overview

1

Introduction

This chapter describes peripheral devices that can be connected to XBT GC Series units along with the name and functions of each part.

WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.*
- Each implementation of a XBT GC unit must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

*For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
1.1	System Design	11
1.2	Accessories	18
1.3	Part Names and Functions	24

1.1 System Design

Introduction

The following section illustrates the standard range of items that can be connected to XBT GC1000/2000 Series units.

What's in this Section?

This section contains the following topics:

Topic	Page
Overview of the Product Range	12
XBT GC1000 Series: System Architecture	13
XBT GC2000 Series: System Architecture	15

Overview of the Product Range

XBT GC Series References

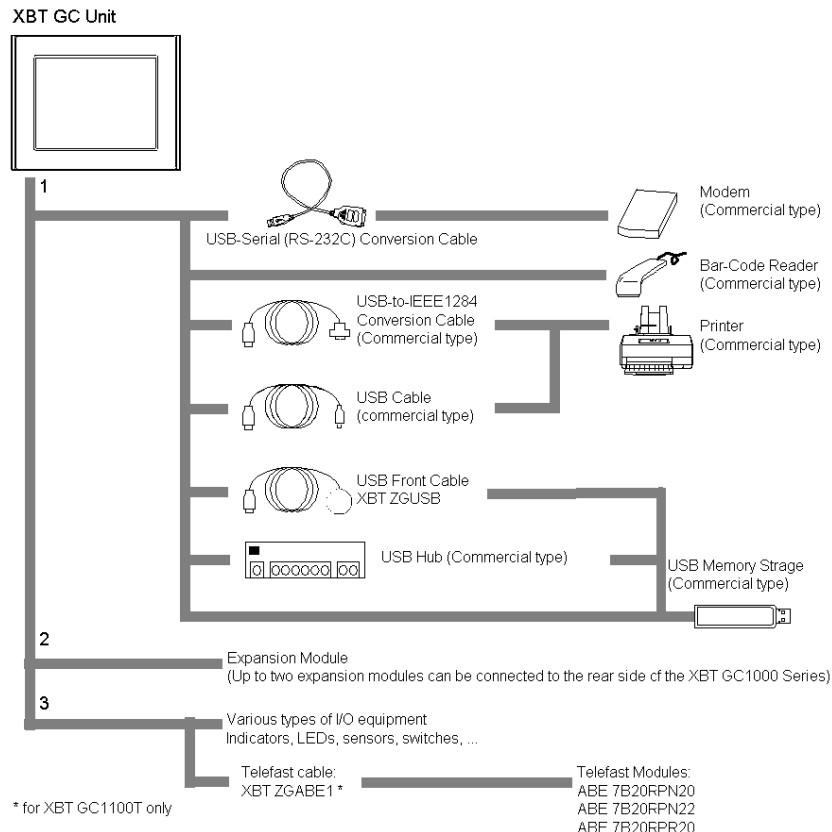
Series	Screen type	Output type	Reference
XBT GC1000 Series	3.8 in Monochrome Amber/Red LCD	Sink	XBT GC1100U
		Source	XBT GC1100T
XBT GC2000 Series	5.7 in Monochrome LCD	Sink	XBT GC2120U
		Source	XBT GC2120T
	5.7 in STN color LCD	Sink	XBT GC2230U
		Source	XBT GC2230T

XBT GC1000 Series: System Architecture

Introduction

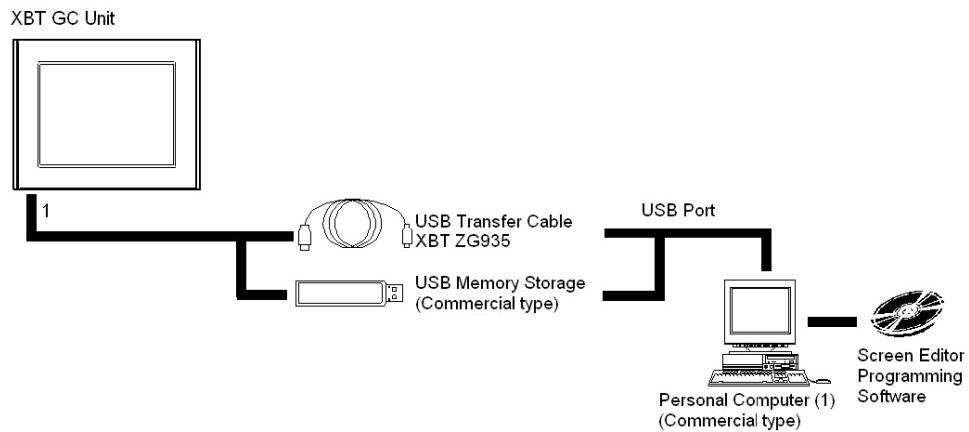
The following diagrams illustrate the standard range of items that can be connected to XBT GC1000 Series units.

RUN Mode Peripherals



N°	XBT GC Interfaces
1	USB Host Interface
2	Expansion Module Interface (See <i>I/O Expansion Modules, page 21</i>)
3	DIO Interface

EDIT Mode Peripherals



(1) Certain types and models of PCs cannot be used, refer to programming software online help.

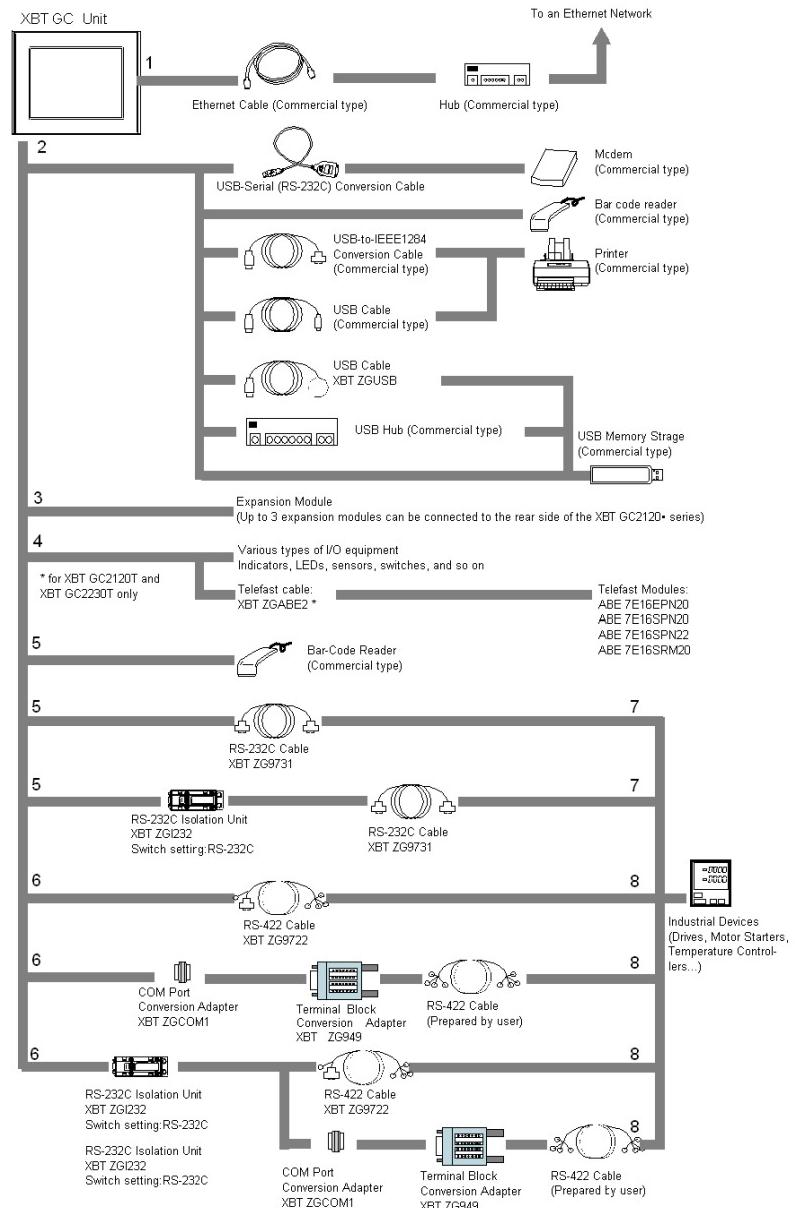
Nº	XBT GC Interfaces
1	USB Host Interface

XBT GC2000 Series: System Architecture

Introduction

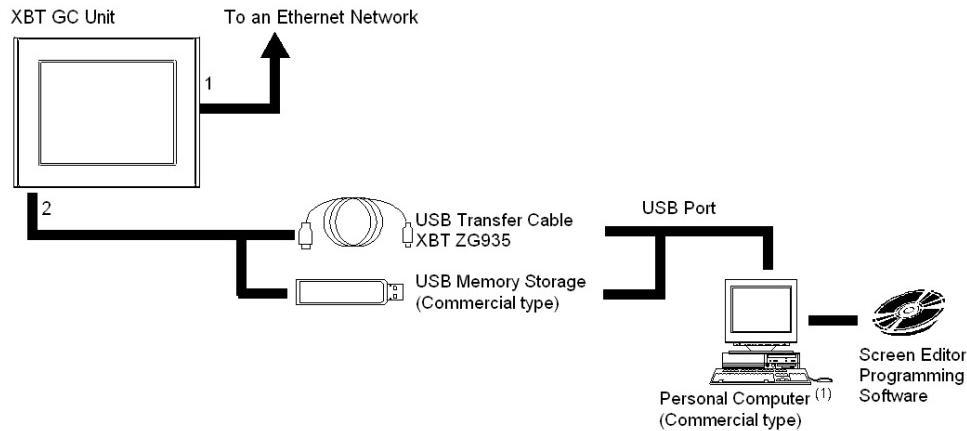
The following diagrams illustrate the standard range of items that can be connected to XBT GC2000 Series units.

RUN Mode Peripherals



N°	XBT GC Interfaces
1	Ethernet Interface (10BASE-T/100BASE-TX) Not available with XBT GC2120• units.
2	USB Host Interface
3	Expansion Module Interface (See <i>I/O Expansion Modules, page 21</i>)
4	DIO Interface
5	Serial Interface (COM1) (RS232C mode)
6	Serial Interface (COM1) (RS422 mode)
Temperature Controller (etc.) Interfaces	
7	RS232C Port
8	RS422 Port

EDIT Mode Peripherals



(1) Certain types and models of PCs cannot be used. Refer to programming software online help.

N°	XBT GC Interfaces
1	Ethernet Interface (10BASE-T/100BASE-TX) Not available with XBT GC2120• units.
2	USB Host Interface

1.2 Accessories

Introduction

The following section describes accessories that can be connected to XBT GC Series units.

What's in this Section?

This section contains the following topics:

Topic	Page
Accessories	19
I/O Expansion Modules	21

Accessories

USB Host Interface

Product Name	Reference	Description
USB Transfer Cable	XBT ZG935	Downloads project data created with the Screen Editor via the XBT GC unit's USB I/F.
USB Front Cable	XBT ZGUSB	Extension cable attaching USB port to front panel.

Serial Interface Item

Product Name	Reference	Description
RS-232C Cable	XBT ZG9731	Interface cable for communication between a temperature controller/various boards and the XBT GC2000 series via RS-232C.
RS-422 Cable	XBT ZG9722	Interface cable for communication between a temperature controller/various boards and the XBT GC2000 series via RS-422.
RS232C Isolation Unit	XBT ZGI232	Unit for providing isolated connection between a temperature controller/various boards and the XBT GC2000 series. RS-232C and RS-422 are switchable.
COM Port Conversion Adapter	XBT ZGCOM1	Connects optional RS-422 communication items to XBT GC2000 series unit's COM1 port.
Terminal Block Conversion Adapter	XBT ZG949	Connects output from a serial interface with an RS-422 terminal block.

Communication Module

Product Name	Reference	Description
CANopen Master Module	XBT ZGCCAN	Communication on CANopen network.

Telefast Cable

Product Name	Reference	XBT GC Reference	Description
Telefast Cable	XBT ZGABE1	XBT GC1100T	2m Interface to connect to ABE 7B20RPN20, ABE 7B20RPN22 and ABE 7B20RPR20 Telefast modules
	XBT ZGABE2	XBT GC2120T, XBT GC2230T	2m Interface to connect to ABE 7E16EPN20, ABE 7E16SPN20, ABE 7E16SPN22 and ABE 7E16SRM20 Telefast modules

Overview

Option Items

Product Name	Reference	Series	Description
Screen Protection Sheet	XBT ZG60	XBT GC1000	Disposable, dirt-resistant sheet for the XBT GC unit's screen.(5 sheets/set)
	XBT ZG62	XBT GC2000	

Maintenance Items

Product Name	Reference	Series	Description
Installation Fastener	XBT ZGFI	XBT GC1000 XBT GC2000	Used to install the XBT GC into a solid panel.
Installation Gasket	XBT ZG51	XBT GC1000	Provides dust and moisture resistance when XBT GC is installed into a solid panel.
	XBT ZG52	XBT GC2000	
DIO Connector	XBT ZGDIO1	XBT GC1000	Attached to the DIO interface. Connects an external I/O device. (5 connectors/set)
	XBT ZGDIO2	XBT GC2000	
DIO Cable	XBT ZGABE1	XBT GC1000	Used to connect the DIO Interface to Telefast modules (1 HE10 connector, 26 pins).
	XBT ZGABE2	XBT GC2000	Used to connect the DIO Interface to Telefast modules (2 HE10 connectors, 20 pins).
USB Cable Clamp	XBT ZGCLP2	XBT GC1000	USB Cable clamp used to prevent disconnection.
	XBT ZGCLP4	XBT GC2000	
DC Power Supply Connector for Medium-sized Units	XBT ZGPWS1	XBT GC1000 XBT GC2000	Used to attach power supply to medium-sized units.
Expansion Module Securing Hook	XBT ZGCHOK	XBT GC2000	Used to secure 3 expansion modules to the XBT GC2000 series.

I/O Expansion Modules

I/O Expansion Modules

I/O Expansion Module for XBT GC1000/2000 Series:

I/O Type	Description	Connector	Reference	Thickness in mm (in)	Thickness Type
Digital	8 DC Input	Removal screw	TM2 DDI8DT	23.5 (0.925)	B
	16 DC Input		TM2 DDI16DT		
	16 DC Input	HE10	TM2 DDI16DK	29.7 (1.17)	C
	32 DC Input		TM2 DDI32DK		
	8 Relay Output	Removal screw	TM2 DRA8RT	23.5 (0.925)	B
	16 Relay Output		TM2 DRA16RT		
	4 DC Input 4 Relay Output		TM2 DMM8DRT		
	16 DC Input 8 Relay Output		TM2 DMM24DRF	39.1 (1.54)	D
	8 Transistor Source Output 0.35 A	HE10	TM2 DDO8TT	23.5 (0.925)	B
	16 Transistor Source Output 0.35 A		TM2 DDO16TK	17.6 (0.69)	A
	32 Transistor Source Output 0.35 A		TM2 DDO32TK	29.7 (1.17)	C
8 AC Input 120 V	8 Transistor Sink Output 0.3 A	Removal screw	TM2 DAI8DT	23.5 (0.925)	B
			TM2 DDO8UT		
16 Transistor Sink Output 0.1 A	32 Transistor Sink Output 0.1 A	HE10	TM2 DDO16UK	17.6 (0.69)	A
			TM2 DDO32UK	29.7 (1.17)	C

I/O Type	Description	Connector	Reference	Thickness in mm (in)	Thickness Type
Analog	2 Analog Input 0...10 V /4...20 mA	Removal screw	TM2 AMI2HT	23.5 (0.925)	B
	1 Analog Output 0...10 V /4...20 mA		TM2 AMO1HT		
	2 Analog Input 0...10 V / 4...20 mA, 1Analog Output 0...10 V / 4...20 mA		TM2 AMM3HT		
	2 Analog Input Thermo / PT100, 1Analog Output 0...10 V / 4...20 mA		TM2 ALM3LT		
	2 Analog Input Thermo		TM2 AMI2LT		
	2 Analog Input 0...10 V /4...20 mA / PT/NI100 / PT/NI1000		TM2 AMI4LT		
	8 Analog Input 0...10 V /4...20 mA		TM2 AMI8HT		
	8 Analog Input PTC/NTC		TM2 ARI8HT		
	2 Analog Output +/- 0...10 V		TM2 AVO2HT		
	2 Analog Input 0...10 V / 4...20 mA, 2Analog Output 0...10 V / 4...20 mA		TM2 AMM6HT		
	8 Analog Input PT100/1000		TM2 ARI8LT		
	8 Analog Input PT100/1000	RJ11	TM2 ARI8LRJ		

Allowed Combination Principle

Due to vibration and concussion resistance, the total thickness of the expansion modules must be lower than 60 mm (2.36 in), unless using the hook XBT ZGCHOK for 23.5 mm (0.925 in) and 17.6 mm (0.69 in) modules.

XBT GC1000 Allowed Combination

Combination of 2 expansion modules:

Type	Type	Total Thickness in mm (in)	Combination
A	A	35.2 (1.38)	Allowed
A	B	41.1 (1.62)	
B	B	47.0 (1.85)	
A	C	47.3 (1.86)	
B	C	53.2 (2.09)	
A	D	56.7 (2.23)	
C	C	59.4 (2.34)	
B	D	62.6 (2.46)	Not Allowed
C	D	68.8 (2.71)	
D	D	78.2 (3.08)	

XBT GC2000 Allowed Combination

Combination of 2 expansion modules:

Type	Type	Total Thickness in mm (in)	Combination
A	A	35.2 (1.38)	Allowed
A	B	41.1 (1.62)	
B	B	47.0 (1.85)	
A	C	47.3 (1.86)	
B	C	53.2 (2.09)	
A	D	56.7 (2.23)	
C	C	59.4 (2.34)	
B	D	62.6 (2.46)	Not Allowed
C	D	68.8 (2.71)	
D	D	78.2 (3.08)	

Combination of 3 expansion modules:

Type	Type	Type	Total Thickness in mm (in)	Combination
A	A	A	52.8 (2.08)	Allowed with hook
A	A	B	58.7 (2.31)	
A	B	B	64.6 (2.54)	
B	B	B	70.5 (2.77)	
ALL OTHERS COMBINATIONS				Not Allowed

1.3 Part Names and Functions

Introduction

The following section describes part functions of XBT GC Series units.

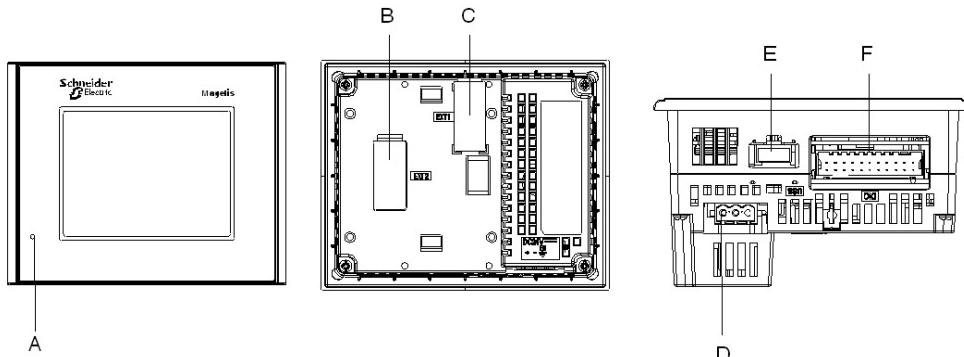
What's in this Section?

This section contains the following topics:

Topic	Page
XBT GC1000 Series: Parts Description	25
XBT GC2000 Series: Parts Description	27

XBT GC1000 Series: Parts Description

Description



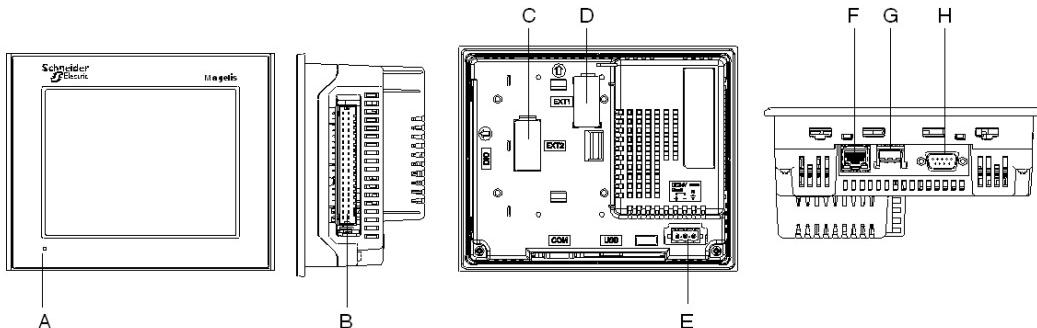
Label	Part name	Description
A	Status LED	Indicates the XBT GC's status, e.g. power input, firmware RUN status or backlight condition. Also, indicates the status of logic program execution. See table below.
B	AUX Unit Interface / Expansion Unit (EXT2)	Interface where additional units such as communication devices can be connected.
C	Expansion Module Interface (EXT1)	Interface to mount the Expansion Module.
D	Power Plug Connector	Used to connect external 24 VDC power supply to terminal.
E	USB Host Interface (USB)	Conforms to USB1.1. (TYPE-A conn.) Power Supply Voltage: 5 VDC 5% Output Current: 500 mA (at maximum) Connects a data transfer cable or USB-compatible printer. The maximum communication distance is 5 m (16.4 ft).
F	DIO Interface (DIO)	Interface to mount external I/O equipment using the DIO connector.

Status LED :

Color	Indicator	Operation Mode (Drawing)	Logic execution mode (when logic is enabled)
Green	ON	OFFLINE	-
		In operation	RUN
	Flashing	In operation	STOP
Red	ON	When power is turned on.	
	Flashing	In operation	Major Error
Orange	ON	Backlight burnout	
	Flashing	During software startup	

XBT GC2000 Series: Parts Description

Description



Label	Part name	Description
A	Status LED	Indicates the XBT GC's status, e.g. power input, firmware RUN status or backlight condition. Also, indicates the status of logic program execution. See table below.
B	DIO Interface (DIO)	Interface to mount external I/O equipment using the DIO connector.
C	AUX Unit Interface / Expansion Unit (EXT2)	Interface where additional units such as communication devices can be connected.
D	Expansion Module Interface (EXT1)	Interface to mount the Expansion Module.
E	Power Plug Connector	Used to connect external 24 VDC power supply to terminal.
F	Ethernet Interface (10BASE-T/100BASE-TX) Not available with XBT GC2120• units	Ethernet transmission interface (10BASE-T/100BASE-TX). An RJ-45 type modular jack connector (8-pole) is used. The LED turns on or off to indicate the current status. See table below.
G	USB Host Interface (USB)	Conforms to USB1.1. (TYPE-A conn.) Power Supply Voltage: 5 VDC 5% Output Current: 500 mA (at maximum) Connects a data transfer cable or USB-compatible printer. The maximum communication distance is 5 m (16.4 ft).
H	Serial Interface (COM1)	RS232C/RS422/RS485 serial interface. SUB-D 9-pin plug type connector. Communication method is switched via software.

Status LED :

Color	Indicator	Operation Mode (Drawing)	Logic execution mode (when logic is enabled)
Green	ON	OFFLINE	-
		In operation	RUN
	Flashing	In operation	STOP
Red	ON	When power is turned on.	
	Flashing	In operation	Major Error
Orange	ON	Backlight burnout	
	Flashing	During software startup	

Ethernet LED :

LED	Status	Description
Green	ON	Data transmission available
	OFF	No connection or subsequent transmission failure
Yellow	ON	Data transmission is occurring
	OFF	No data transmission

Specifications

2

Introduction

This chapter describes the general, functional and interface specifications of the XBT GC as well as its part names and dimensions.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
2.1	XBT GC1000 Series Specifications	30
2.2	XBT GC2000 Series Specifications	52

2.1 XBT GC1000 Series Specifications

Introduction

This section describes the specifications of the XBT GC1000 Series units.

What's in this Section?

This section contains the following topics:

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Performance Specifications	34
Interface Specifications	36
Wiring to the DIO Connector	45
XBT GC1000 Series Dimensions	48

General Specifications

Electrical Specifications

Characteristics		Specifications
Power Supply	Input Voltage	24 VDC
	Rated Voltage	19.2...28.8 VDC
	Allowable Voltage Drop	10 ms (max.)
	Power Consumption	18 W (max.)
	In-Rush Current	30 A (max.)
Voltage Endurance		1000 VAC 20 mA for 1 minute (between charging and FG terminals)
Insulation Resistance		500 VDC 10 MΩ (min.) (between charging and FG terminals)

Environmental Specifications

Characteristics		Specifications
Physical	Surrounding Air Temperature	0...50 °C (32...122 °F) ⁽¹⁾
	Storage Temperature	-20...60 °C (-4...140 °F)
	Ambient Humidity	10...90 % RH (Wet bulb temperature: 39 °C max. (102.2 °F) - no condensation)
	Storage Humidity	10...90 % RH (Wet bulb temperature: 39 °C max. (102.2 °F) - no condensation)
	Dust	0.1mg/m ³ and below (non-conductive levels)
	Pollution Degree	For use in Pollution Degree 2 environment
	Atmosphere	Free of corrosive gases
	Air Pressure Vibration Resistance (availment altitude)	800...1114hPa (2000 meters (6,562 ft) above sea-level and below)
Mechanical	Vibration Resistance	EC61131-2 compliant 5 to 9 Hz single-amplitude 3.5 mm (0.14 in) 9 to 150 Hz constant-accelerated velocity 9.8 m/s ² X, Y, Z directions for 10 cycle (100 minute)
	Concussion Resistance	IEC61131-2 compliant (147 m/s ² X, Y, Z directions for 3 time)
Electrical	Noise Immunity	Noise Voltage: 1000VP-P Pulse Duration: 1µs Rise Time: 1ns (via noise simulator)
	Electrostatic Discharge Immunity	6 kV (complies with EN 61000-4-2 Level 3)

(1) Extended use in environments where surrounding air temperature is 40°C (104 °F) or higher may degrade the display quality and result in decreased contrast.

Structural Specifications

Installation	Specifications
Grounding	Grounding resistance of 100 Ω 2 mm ² (AWG 14), thicker wire or your country's applicable standard. (Same for FG and SG terminals)
Structure ⁽¹⁾	Rating: Equivalent to IP65f NEMA #250 TYPE 4X/13 (Front surface at panel embedding) Feature size: All-in-one Installation configuration: Panel embedding
Cooling Method	Natural air circulation
Weight Approx.	1.0 kg (2.2 lb) max. (unit only)
External Dimensions	W130.0mm (5.12in) X H104.0mm (4.09in) X D76.5mm (3.01in)
Panel Cut Dimensions	W118.5mm (4.67in) X H92.5mm (3.64in) ⁽²⁾ Panel thickness: 1.6...5.0 mm (0.06...0.20 in)

⁽¹⁾ The front face of the XBT GC unit, installed in a solid panel, has been tested using conditions equivalent to the standards shown in the specification. Even though the XBT GC unit's level of resistance is equivalent to these standards, oils that should have no effect on the XBT GC can possibly harm the unit. This can occur in areas where either vaporized oils are present, or where low viscosity cutting oils are allowed to adhere to the unit for long periods of time. If the XBT GC's front face protection sheet becomes peeled off, these conditions can lead to the ingress of oil into the XBT GC and separate protection measures are suggested.

Also, if non-approved oils are present, it may cause deformation or corrosion of the front panel's plastic cover. Therefore, prior to installing the XBT GC, be sure to confirm the type of conditions that will be present in the XBT GC's operating environment. If the installation gasket is used for a long period of time, or if the unit and its gasket are removed from the panel, the original level of the protection is compromised.

To maintain the original protection level, be sure to replace the installation gasket regularly.

⁽²⁾ As for dimensional tolerance everything +1/-0mm and R in angle are below R3.

Performance Specifications

Performance Specifications

Characteristics		Specifications
Backup memory (Alarm, retain variables...) ⁽¹⁾		SRAM 512 K byte
Interface	DIO	Interface to external I/O equipment Input/Output points: 12-point inputs, 6-point outputs Connector: 22 pins
	AUX Interface / Expansion unit	Interface for external additional unit only (such as communication equipment) (external)
	USB Host Interface	Conforms to USB1.1. (TYPE-A conn.) x 1 Power Supply Voltage: 5 VDC 5% Output Current: 500 mA (max.) Communication Distance: 5 m max. (16.4 ft)
	Expansion Module Interface	Interface for Expansion Modules (Up to two Expansion Modules can be connected)
Clock Accuracy ⁽²⁾		65 seconds/ month (at room temperature)
Maximum Application HMI + Control		16 MB FLASH EPROM

⁽¹⁾ It is user active capacity.

⁽²⁾ The XBT GC's internal clock may add or lose seconds over time. At normal operating temperatures and conditions, with the XBT GC operating from its lithium battery, the degree of error is 65 seconds per month. Variations in operating conditions and battery life can cause this error to vary from -380 to +90 seconds per month. For systems where this degree of error will be a problem, the user should be sure to monitor this error and make adjustments when required.

NOTE:

- When the message "RAAA051 Low battery" is displayed, supply power to the display unit and fully charge the battery. The battery charges within 24 hours to a level which allows backup operation. Completing a full charge requires about 96 hours (4 days).
- A Lithium battery's lifetime is:
 - 10 years when the battery's ambient temperature is 40° C (104° F) or less,
 - 4.1 years when the battery's ambient temperature is 50° C (122° F) or less,
 - 1.5 years when the battery's ambient temperature is 60° C (140° F) or less.

When used for backup:

- approximately 100 days, with a fully charged battery,
- approximately 6 days, with a half-charged battery.

Display Specifications

Characteristics	Specifications
Display Type	Monochrome Amber/ Red LCD
Resolution	W320 x H240 pixels
Dot pitch	W0.24 mm (0.01 in) x H0.24 mm (0.01 in)
Effective Display Area	W78.8 mm (3.10 in) x H59.6 mm (2.35 in)
Color/Shade level	Black and White (8 Shades)
Backlight	Amber/ Red LED Note: Not user replaceable. When replacement is required, contact your local distributor.
Brightness control	8 levels of adjustment available via touch panel
Contrast Adjustment	8 levels of adjustment available via touch panel
Display Service Life	MTBF value: 50,000 hrs. (TYP) Note: Backlight display service life is not included.
Backlight Service Life	50,000 hrs. or more (at 25°C (77°F) and continuous operation - period until backlight brightness decreases to 50%)
Language Fonts	Japanese: 6962 (JIS Standards 1 & 2) (including 607 non-kanji characters) ANK: 158 (Korean fonts, Simplified Chinese and Taiwanese traditional Chinese fonts are downloadable).
Text composition	Character Sizes Standard font: 8x8, 8x16, 16x16 and 32x32 dot fonts Stroke font: 6 to 127dot fonts
	Font Sizes Standard font: Width can be expanded up to 8 times Height can be expanded up to 8 times ⁽¹⁾
Text	8 x 8 dots 40 Char. x 30 rows
	8 x 16 dots 40 Char. x 15 rows
	16 x 16 dots 20 Char. x 15 rows
	32 x 32 dots 10 Char. x 7 rows

⁽¹⁾ Font sizes other than those above can be set up by software.

Touch Panel Specifications

Characteristics	Specifications
Type	Resistive Film (analog)
Resolution	1024 x 1024
Service Life	1,000,000 times or more

Interface Specifications

DIO Interface (Connector)

Important: When preparing the cable to connect the wiring, check the pin numbers inscribed on the DIO Connector.

Connector XBT ZGDIO1 :

Pin Arrangement	Pin N°	Signal Name	Pin N°	Signal Name
A1	A1	IN1	B1	IN0 (CT0)
	A2	IN3	B2	IN2 (CT1)
	A3	IN5	B3	IN4 (CT2)
	A4	IN7	B4	IN6 (CT3)
	A5	IN9	B5	IN8
	A6	IN11	B6	IN10
	A7	NC	B7	COM
	A8	0V	B8	+24V
A11 (Cable connection side)	A9	OUT1 (PLS1, PWM1)	B9	OUT0 (PLS0, PWM0)
	A10	OUT3 (PLS3, PWM3)	B10	OUT2 (PLS2, PWM2)
	A11	OUT5	B11	OUT4

NOTE: Parenthesized signal names () indicate when Pulse Output (PLS•), PWM Output (PWM•), or Counter Input (CT•) are used.

Input Specifications

Characteristics		Specifications
Rated Voltage	24 VDC	
Maximum Allowable Voltage	28.8 VDC	
Input Method	Sink/Source Input	
Rated Current	6.5 mA (24 VDC) (IN0, IN2, IN4, IN6) 5 mA (24 VDC) (Other input)	
Input Resistance	Approx. 3.7 KΩ (IN0, IN2, IN4, IN6) Approx. 4.7 KΩ (Other input)	
Input Derating	See <i>Input Derating, page 38</i>	
Input Points	12	
Common Lines	1	
Common Design	12 points/1 common line	
Operation Range	ON Voltage	19 VDC or more
	OFF Voltage	5 VDC or less
Input Delay Time ⁽¹⁾	OFF to ON	0.5 to 20ms ⁽²⁾
	ON to OFF	0.5 to 20ms ⁽²⁾
Input Signal Display	No LED indicators	
Status Display	None	
Isolation Method	Photocoupler Isolation	
External Connection	22-pin connector (used with Output section)	
External Power Supply	For Signal: 24 VDC	

⁽¹⁾ In the case of IN0, IN2, IN4 and IN6, the input delay time generates a 5µs-delay.
For example, in the case of a 0.5ms-cycle sampling:

$$5\mu\text{s} (\text{ON to OFF}) + 0.5\text{ms} (\text{sampling cycle}) + 5\mu\text{s} (\text{OFF to ON}) = 0.51\text{ms}$$

A minimum 0.51ms-restriction is imposed on the input pulse width.

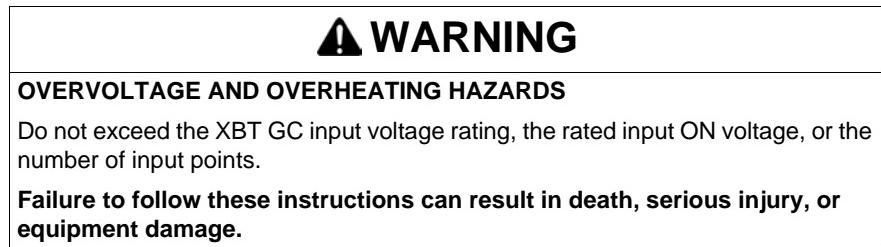
In the case of IN1, IN3, IN5 and from IN7 to IN11, the input delay time generates a 0.5ms-delay. For example, in the case of a 0.5ms-cycle sampling:

$$0.5\text{ms} (\text{ON to OFF}) + 0.5\text{ms} (\text{sampling cycle}) + 0.5\text{ms} (\text{OFF to ON}) = 1.5\text{ms}.$$

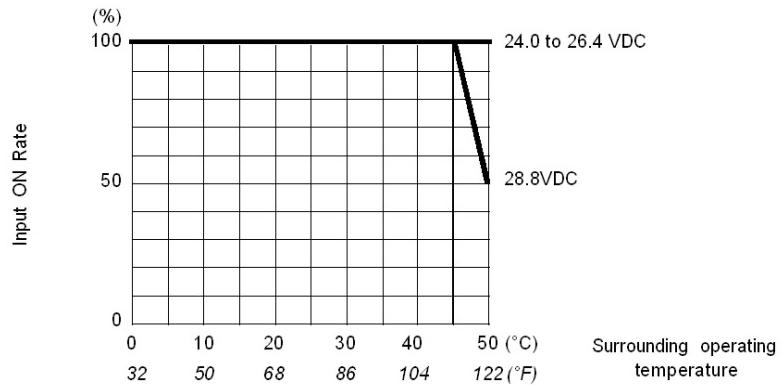
A minimum 1.5ms-restriction is imposed on the input-pulse width.

⁽²⁾ Digital filter can be set at intervals of 0.5 ms.

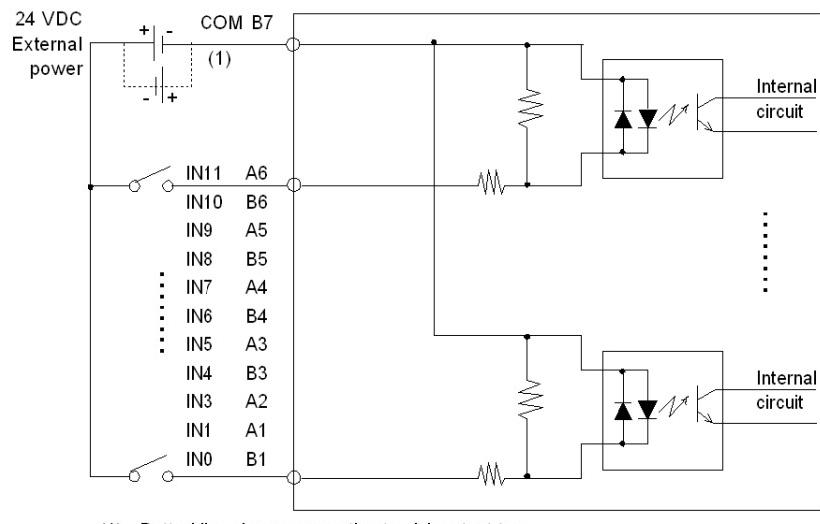
Input Derating



Refer to the following drawing and perform Input Derating within the XBT GC unit's rated range.



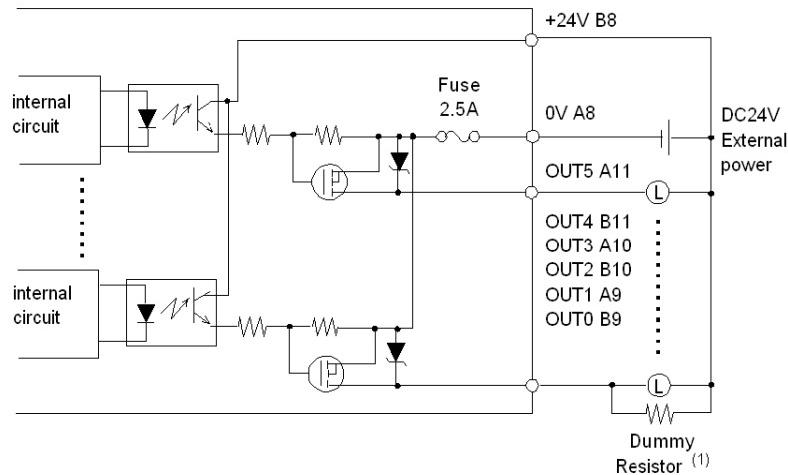
Input Circuit



Output Specifications

Output Terminal	OUT0 to OUT3		OUT4 to OUT5
Rated Voltage	24 VDC		
Allowable Voltage Range	20.4...28.8 VDC		
Output Method	XBT GC1100U	Sink Output	
	XBT GC1100T	Source Output	
Maximum Load Voltage	0.2 A/point, 1.2 A/common		
Output Voltage Drop	0.5 VDC or less		
Output Delay Time	OFF to ON	5 µs or less (With output at 24 VDC, 200 mA)	0.5 ms or less (With output at 24 VDC, 200 mA)
	ON to OFF	5µs or less (With output at 24VDC, 200mA)	0.5ms or less (With output at 24VDC, 200mA)
Voltage Leakage (when OFF)	0.1 mA or less		
Clamp Voltage	39 V 1 V		
Type of Output	Transistor Output		
Common Lines	1		
Common Design	6 points/1 common line		
External Connection	22-pin connector (also used for Input)		
Output Protection Type	Output is unprotected		
Internal Fuse	2.5 A, 125 V Chip fuse (not replaceable)		
Surge Control Circuit	Zener diode		
Output Points	6		
Output Signal Display	No LED indicators		
Status Display Element	None		
Isolation Method	Photocoupler Isolation		
External Power Supply	For Signal: 24 VDC		

XBT GC1100U Output Circuit (Sink type) :



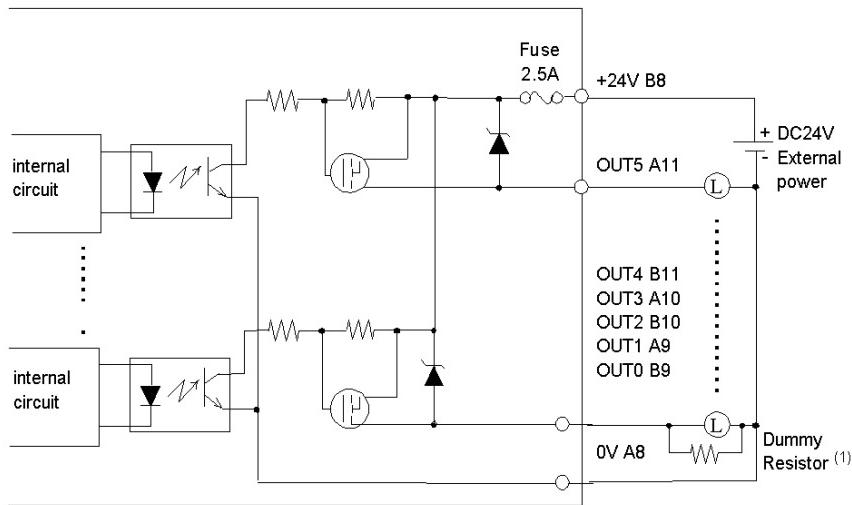
(1) (Example) The output delay time (OFF to ON) is 1.5 μ s where the output current is 24 VDC, 50 mA. Install an external dummy resistor to increase the amount of current when more responsiveness is required and the load is light.

 WARNING
OUTPUT SHORT CIRCUIT OR OVERVOLTAGE

Install an appropriate fuse (500 mA compliant with UL248-1) to protect the output line from an abnormal short-circuit or connection overload condition.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

XBT GC1100T Output Circuit (Source type) :



(1) (Example) The output delay time (OFF to ON) is 1.5 μ s where the output current is 24 VDC, 50 mA. Install an external dummy resistor to increase the amount of current when more responsiveness is required and the load is light.

⚠️ WARNING

OUTPUT SHORT CIRCUIT OR OVERVOLTAGE

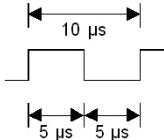
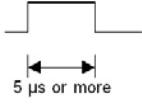
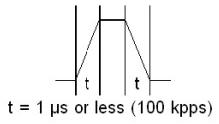
Install an appropriate fuse (500 mA compliant with UL248-1) to protect the output line from an abnormal short-circuit or connection overload condition.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

High-Speed Counter / Pulse Cath Input Specifications

DIO Standard Input/Output is used as a High-Speed Counter Input. The setup is done by the programming software. This function will be available from the second version of the Software.

For more information, refer to the programming software User Manual.

Characteristics	Counter		Pulse Catch
Input	24 VDC Open Collector		24 VDC Open Collector
	Single Phase (4 points)	2 Phase (1 point or 2 points)	
Input Points	CT0 (IN0), CT1 (IN2), CT2 (IN4), CT3 (IN6)	CT0 (IN0), CT1 (IN2) (used as pair) CT0: A Phase, CT1: B Phase CT2 (IN4), CT3 (IN6) CT2: A Phase, CT3: B Phase	IN0, IN2, IN4, IN6
Min. Pulse Width (Pulse Input)			Input signal ON width 
Count Speed (Rise, Fall time)			-
Phase	1 Phase	90 degree phase differential 2-phase signal 1 phase + directional signal	-
High Speed Count Frequency	100 Kpps	50 Kpps	-
Count Edge designation	Available	Not Available	-
Count Register	32 Bit UP/DOWN Counter		-
Counter Mode change	Set through software		-
Upper/Lower Limit Setting	Not Available		-
Preload - Prestrobe	Available		-
Marker Input (Counter Value Clear)	None	IN3, IN7	-

Pulse/PWM Output Specifications

DIO Standard Input/Output is used as a Pulser Output or PWM Output. The setup is done by the programming software. This function will be available from the second version of the Software.

For more information, refer to the programming software User Manual.

Characteristics	Pulse Output	PWM Output
Output Points	4 points	
Output Method	PLS0 to PLS3 (OUT0 to OUT3) defined by user	PWM0 to PWM3 (OUT0 to OUT3) defined by user
Load Voltage	24 VDC	
Min. Load Current	1 mA	
Max. Output Frequency	Up to 65 kHz possible per point (set through software)	
Pulse Acceleration/Deceleration Speed	Available	-
ON Duty	50% 10% (at 65 kHz) ⁽¹⁾	19 to 81% (at 65 kHz) ⁽²⁾

⁽¹⁾ The ON Duty error (10%) will be reduced if the Output frequency is low.

⁽²⁾ The ON Duty (effective range) will be widened if the Output frequency is low.

Wiring to the DIO Connector

Introduction

WARNING

ELECTRIC SHOCK

Be sure to remove the DIO Connector from the XBT GC unit prior to starting wiring.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Items Required to Wire Connectors

Screwdriver

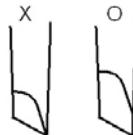
Recommended type: 1891348-1 (Tyco Electronics AMP)

If another manufacturer is used, be sure the part has the following dimensions:

- point depth: 1.5 mm (*0.06 in*)
- point height: 2.4 mm (*0.09 in*)

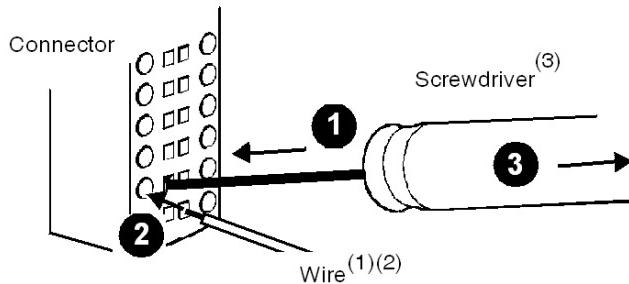
Point shape should be DIN5264A, and meet Security Standard DN EN60900.

Also, the screwdriver's tip should be flat as indicated in order to access the narrow hole of the connector:



The connectors are a spring clamp type.

Procedure



(1) Wire should be AWG24 to AWG18 thick, and twisted. Applicable wire sizes are UL1015 and UL1007.

(2) Be sure to strip at least 7.0mm [0.28in.] of cover from the wire.

(3) Do not rotate the point of the screwdriver inside the square-shaped opening. It may damage the equipment.

Use the following procedure to connect the wires to the connectors:

Step	Action
1	Insert the screwdriver into the square-shaped hole. This will open the wire's round-shaped hole.
2	Hold the screwdriver and insert the wire into the wire's round-shaped hole.
3	Take out the screwdriver from the square-shaped hole. The round-shaped hole will then close, and the wire will be held securely in place.

NOTE: To remove the wire, re-insert the screwdriver into the square-shaped hole and when the wire's spring clamp releases, pull the wire out.

 **CAUTION**

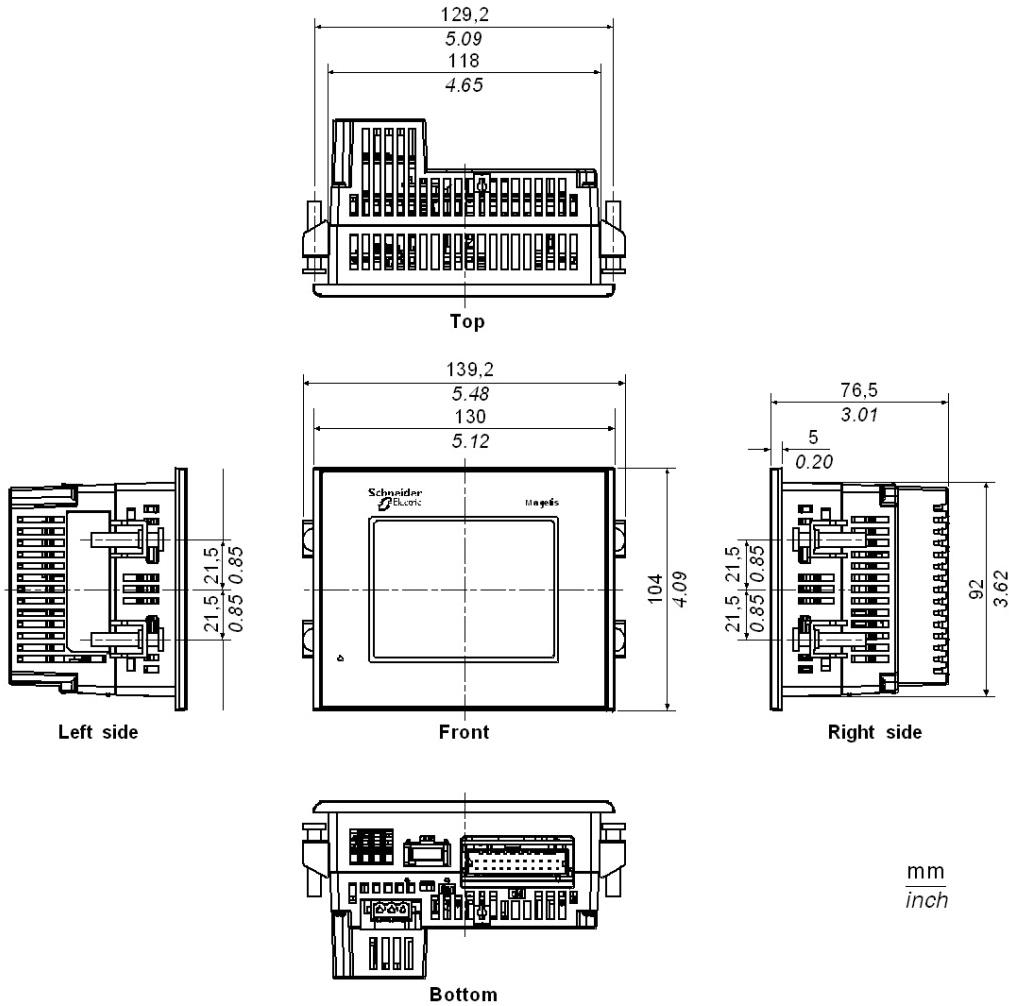
IMPROPER WIRING

- Be sure to strip only the amount of cover required. If too much cover is removed, the end wires may short against each other, or against an electrode, which can create an electric shock. If not enough cover is removed the wire cannot carry a charge.
- Do not solder the wire itself. This could lead to a bad or poor contact.
- Insert each wire completely into its opening. Failure to do so can lead to a unit malfunction or short, either against wire filaments, or against an electrode.

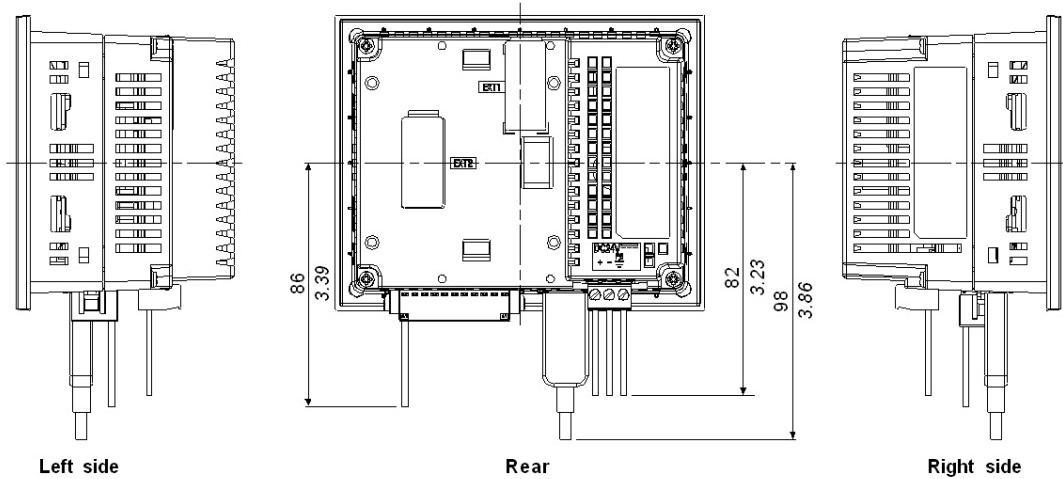
Failure to follow these instructions can result in injury or equipment damage.

XBT GC1000 Series Dimensions

Installation Fasteners Attached Dimensions



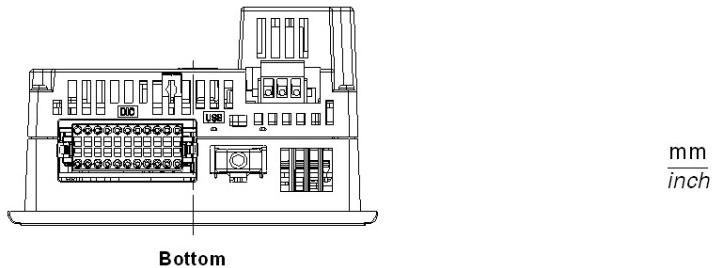
Cable Attached Dimensions



Left side

Rear

Right side

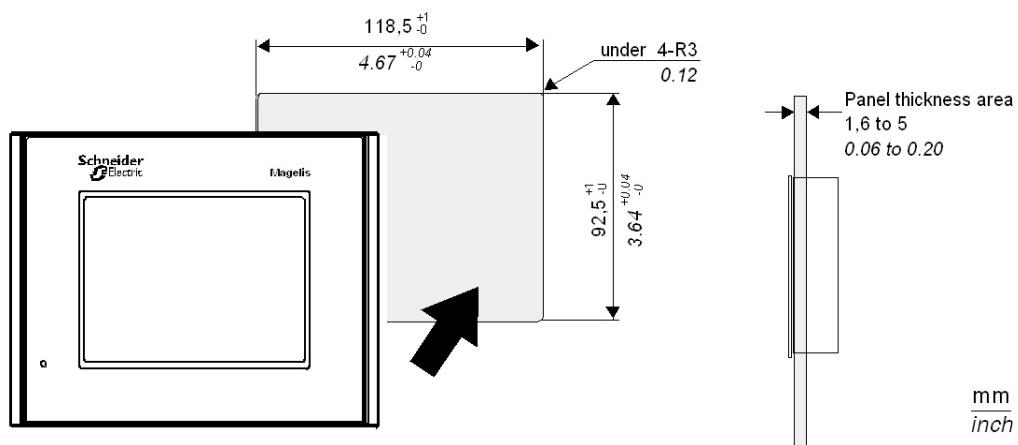


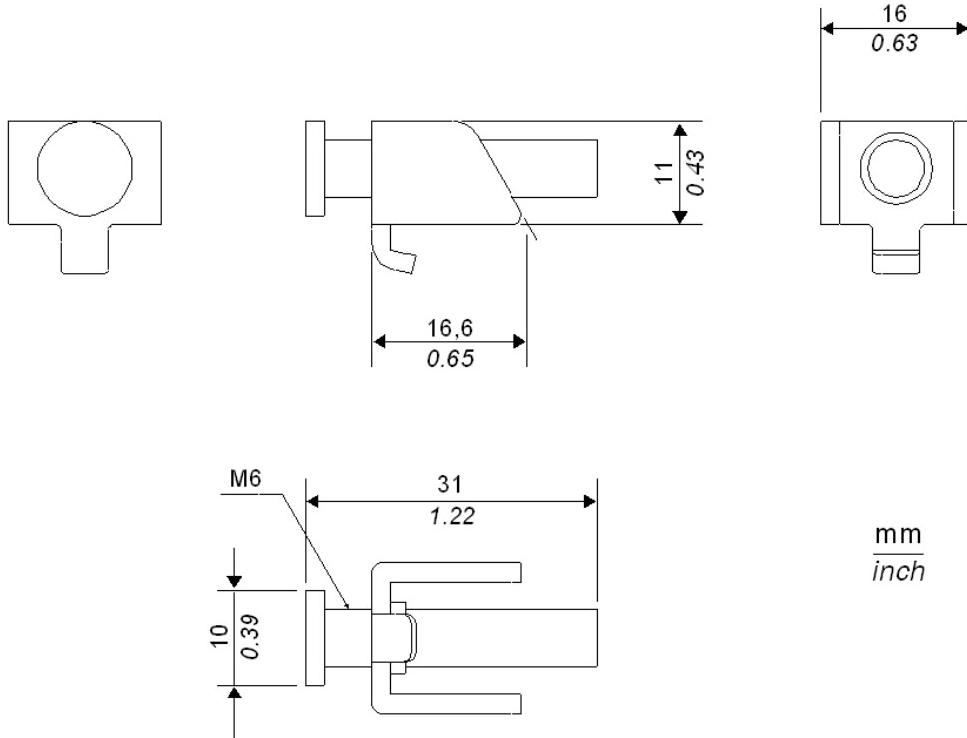
Bottom

mm
inch

Important: All the above values are designed in case of cable bending. The dimensions given here are representative values depending on the type of connection cable used. Therefore, they are all intended for reference only.

Panel Cut Dimensions



Installation Fasteners

2.2 XBT GC2000 Series Specifications

Introduction

This section describes the specifications of the XBT GC2000 Series units.

What's in this Section?

This section contains the following topics:

Topic	Page
General Specifications	53
Performance Specifications	56
Interface Specifications	60
Wiring to the DIO Connector	70
XBT GC2000 Series Dimensions	72

General Specifications

Electrical Specifications

Characteristics		Specifications
Power Supply	Input Voltage	24 VDC
	Rated Voltage	19.2...28.8 VDC
	Allowable Voltage Drop	3 ms (max.)
	Power Consumption	27 W (max.)
	In-Rush Current	30 A (max.)
Voltage Endurance		1000 VAC 20 mA for 1 minute (between charging and FG terminals)
Insulation Resistance		500 VDC 10 MΩ (min.) (between charging and FG terminals)

Environmental Specifications

Characteristics		Specifications
Physical	Surrounding Air Temperature	0...50 °C (32...122 °F) ⁽¹⁾
	Storage Temperature	-20...60 °C (-4...140 °F)
	Ambient Humidity	10...90 % RH (Wet bulb temperature: 39 °C max. (102.2 °F) - no condensation)
	Storage Humidity	10...90 % RH (Wet bulb temperature: 39 °C max. (102.2 °F) - no condensation)
	Dust	0.1 mg/m ³ and below (non-conductive levels)
	Pollution Degree	For use in Pollution Degree 2 environment
	Atmosphere	Free of corrosive gases
	Air Pressure Vibration Resistance (availment altitude)	800...1114hPa (2000 meters (6,562 ft) above sea-level and below)
Mechanical	Vibration Resistance	IEC61131-2 compliant 5 to 9Hz single-amplitude 3.5 mm (0.14 in) 9 to 150Hz constant-accelerated velocity 9.8 m/s ² X, Y, Z directions for 10 cycle (100 minute)
	Concussion Resistance	IEC61131-2 compliant (147m/s ² X, Y, Z directions for 3 time)
Electrical	Noise Immunity	Noise Voltage: 1000V _{P-P} Pulse Duration: 1μs Rise Time: 1ns (via noise simulator)
	Electrostatic Discharge Immunity	6kV (complies with EN 61000-4-2 Level 3)

⁽¹⁾ Extended use in environments where surrounding air temperature is 40°C (104 °F) or higher may degrade the display quality and result in decreased contrast.

Structural Specifications

Installation	Specifications
Grounding	Grounding resistance of 100 Ω 2 mm ² (AWG 14), thicker wire or your country's applicable standard. (Same for FG and SG terminals)
Structure (1)	Rating: Equivalent to IP65f NEMA #250 TYPE 4X/13 (Front surface at panel embedding) Feature size: All-in-one Installation configuration: Panel embedding
Cooling Method	Natural air circulation
Weight Approx.	1.0 kg (2.2 lb) max. (unit only)
External Dimensions	W167.5 mm (6.59 in) X H135.0 mm (5.31 in) X D78.0 mm (3.07 in)
Panel Cut Dimensions	W156.0 mm (6.14 in) X H123.5 mm (4.86 in) ⁽²⁾ Panel thickness: 1.6...5.0 mm (0.06...0.20 in)]

(1) The front face of the XBT GC unit, installed in a solid panel, has been tested using conditions equivalent to the standards shown in the specification. Even though the XBT GC unit's level of resistance is equivalent to these standards, oils that should have no effect on the XBT GC can possibly harm the unit. This can occur in areas where either vaporized oils are present, or where low viscosity cutting oils are allowed to adhere to the unit for long periods of time. If the XBT GC's front face protection sheet becomes peeled off, these conditions can lead to the ingress of oil into the XBT GC and separate protection measures are suggested.

Also, if non-approved oils are present, it may cause deformation or corrosion of the front panel's plastic cover. Therefore, prior to installing the XBT GC be sure to confirm the type of conditions that will be present in the XBT GC's operating environment. If the installation gasket is used for a long period of time, or if the unit and its gasket are removed from the panel, the original level of the protection is compromised.

To maintain the original protection level, be sure to replace the installation gasket regularly.

(2) As for dimensional tolerance everything +1/-0mm and R in angle are below R3.

Performance Specifications

Performance Specifications

Model	XBT GC2120•	XBT GC2230•
Backup memory (Alarm, retain variables...) ⁽¹⁾	SRAM 512 K byte	
Interface	Serial Interface	COM1: RS232C / RS422 / RS485 Asynchronous Transmission: Data Length: 7 bit / 8 bit Parity: none, odd or even Stop Bit: 1 bit / 2 bit Data Transmission Speed: 2400 bps to 115.2 Kbps Connector: SUB-D 9 pin plug
	Ethernet Interface	- Ethernet (IEEE802.3u, 10BASE-T/100BASE-TX) Connector: modular jack connector (RJ-45)
	DIO Interface	Interface for external I/O equipment Input/Output points: 16-point inputs, 16-point outputs Connector: 38 pins
	AUX Unit Interface / Expansion Unit (EXT2)	Interface for external additional unit only (such as communication equipment) (external)
	USB Host Interface	Conforms to USB1.1. (TYPE-A conn.) x 1 Power Supply Voltage: 5 VDC 5% Output Current: 500 mA (max.) Communication Distance: 5 m max. (16.4 ft)
	Expansion Module Interface	Interface for Expansion Modules Three Expansion Modules can be inserted
Clock Accuracy ⁽²⁾	+/- 65 seconds/ month (at room temperature)	
Maximum Application HMI + Control	16 MB FLASH EPROM	

- (1) It is user active capacity.
- (2) The XBT GC's internal clock may add or lose seconds over time. At normal operating temperatures and conditions, with the XBT GC operating from its lithium battery, the degree of error is 65 seconds per month. Variations in operating conditions and battery life can cause this error to vary from -380 to +90 seconds per month. For systems where this degree of error will be a problem, the user should be sure to monitor this error and make adjustments when required.

NOTE:

- When the message "RAAA051 Low battery" is displayed, supply power to the display unit and fully charge the battery. The battery charges within 24 hours to a level which allows backup operation. Completing a full charge requires about 96 hours (4 days).
- A Lithium battery's lifetime is:
 - 10 years when the battery's ambient temperature is 40° C (104° F) or less,
 - 4.1 years when the battery's ambient temperature is 50° C (122° F) or less,
 - 1.5 years when the battery's ambient temperature is 60° C (140° F) or less.

When used for backup:

- approximately 100 days, with a fully charged battery,
- approximately 6 days, with a half-charged battery.

Display Specifications

Model	XBT GC2120•	XBT GC2230•
Display Type	Monochrome LCD	STN Color LCD
Resolution	W320 x H240 pixels	
Dot pitch	W0.36 mm (0.01 in) x H0.36 mm (0.01 in)	
Effective Display Area	W117.2 mm (4.61 in) x H88.4 mm (3.48 in)	
Color/Shade level	Black and White (16 Shades) (Enables blink feature)	4096 Colors (Enables blink feature)
Backlight	White LED Note: Not user replaceable. When replacement is required, contact your local distributor.	
Brightness control	8 levels of adjustment available via touch panel	
Contrast Adjustment	8 levels of adjustment available via touch panel	
Display Service Life	MTBF value: 50,000 hrs. (TYP) Note: Backlight display service life is not included.	
Backlight Service Life	50,000 hrs. or more (at 25°C (77°F) and continuous operation - period until backlight brightness decreases to 50%)	
Language Fonts	Japanese: 6962 (JIS Standards 1 & 2) (including 607 non-kanji characters) ANK: 158 (Korean fonts, Simplified Chinese and Taiwanese traditional Chinese fonts are downloadable.)	
Text composition	Character Sizes	Standard font: 8x8, 8x16, 16x16 and 32x32 dot fonts Stroke font: 6 to 127 dot fonts
	Font Sizes	Standard font: Width can be expanded up to 8 times. Height can be expanded up to 8 times ⁽¹⁾
Text	8 x 8 dots	40 Char. x 30 rows
	8 x 16 dots	40 Char. x 15 rows
	16 x 16 dots	20 Char. x 15 rows
	32 x 32 dots	10 Char. x 7 rows

⁽¹⁾ Font sizes other than those above can be set up by software.

Touch Panel Specifications

Characteristics	Specifications
Type	Resistive Film (analog)
Resolution	1024 x 1024
Service Life	1,000,000 times or more

Interface Specifications

Presentation

This section describes the specifications of each interface of the XBT GC2000 Series unit.

Important:

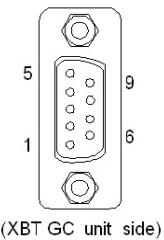
- The XBT GC unit's serial Interface is not isolated. When the host (PLC) unit is also not isolated, be sure to connect the #5 SG (Signal Ground) terminal to reduce the risk of damaging the RS232C/RS422/RS485 circuit.
- In the XBT GC unit, SG (signal ground) and FG (frame ground) are connected internally. When connecting an external device to the XBT GC using the SG terminal, be sure to check that no short-circuit loop is created when you setup the system.

NOTE: When isolation is necessary, you can use the RS232C isolation unit (XBT ZGI232) on COM1.

Serial Interfaces (COM1)

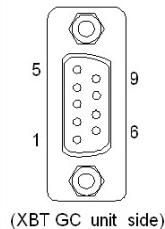
This interface is used to connect an RS232C/RS422/RS485 cable. Communication method is switched via software. SUB-D 9-pin plug connector is used.

In the case of RS232C :

Pin Arrangement	Pin N°	RS232C		
		Signal Name	Direction	Meaning
	1	CD	Input	Carrier Detect
	2	RD (RXD)	Input	Receive Data
	3	SD (TXD)	Output	Send Data
	4	ER (DTR)	Output	Data Terminal Ready
	5	SG	-	Signal Ground
	6	DR (DSR)	Input	Data Set Ready
	7	RS (RTS)	Output	Request to Send
	8	CS (CTS)	Input	Send Possible
	9	CI (RI) / VCC	Input / -	Called status display 5V5% Output 0.25A ⁽¹⁾
	Shell	FG	-	Frame Ground (Common with SG)

⁽¹⁾ The RI/VCC selection for Pin #9 is switched via software. The VCC output is not protected against overcurrent. To prevent damage and ensure proper operation, use only the rated current.

In the case of RS422 / RS485 :

Pin Arrangement	Pin N°	RS422 / RS485		
		Signal Name	Direction	Meaning
 (XBT GC unit side)	1	RDA	Input	Receive Data A(+) / RxD0
	2	RDB	Input	Receive Data B(-) / RxD1
	3	SDA	Output	Send Data A(+) / TxD0
	4	ERA	Output	Data Terminal Ready A(+)
	5	SG	-	Signal Ground
	6	CSB	Input	Send Possible B(-) / TxD1
	7	SDB	Output	Send Data B(-)
	8	CSA	Input	Send Possible A(+)
	9	ERB	Output	Data Terminal Ready B(-)
	Shell	FG	-	Frame Ground / Shield (Common with SG)

DIO Interface (Connector)

Important: When preparing the cable to connect the wiring, check the pin numbers inscribed on the DIO Connector.

Connector XBT ZGDIO2 :

Pin Arrangement	Pin N°	Signal Name	Pin N°	Signal Name
A1	A1	IN1	B1	IN0 (CT0)
	A2	IN3	B2	IN2 (CT1)
	A3	IN5	B3	IN4 (CT2)
	A4	IN7	B4	IN6 (CT3)
	A5	IN9	B5	IN8
	A6	IN11	B6	IN10
	A7	IN13	B7	IN12
	A8	IN15	B8	IN14
	A9	NC	B9	COM
	A10	Sink: NC Source: +24V	B10	Sink: +24V Source: +24V
	A11	Sink: 0V Source: NC	B11	Sink: 0V Source: 0V
	A12	OUT1 (PLS1, PWM1)	B12	OUT0 (PLS0, PWM0)
	A13	OUT3 (PLS3, PWM3)	B13	OUT2 (PLS2, PWM2)
	A14	OUT5	B14	OUT4
	A15	OUT7	B15	OUT6
	A16	OUT9	B16	OUT8
	A17	OUT11	B17	OUT10
	A18	OUT13	B18	OUT12
	A19	OUT15	B19	OUT14

NOTE: Parenthesized signal names () indicate when Pulse Output (PLS•), PWM Output (PWM•), or Counter Input (CT•) are used.

Input Specifications

Characteristics		Specifications
Rated Voltage	24 VDC	
Maximum Allowable Voltage	28.8 VDC	
Input Method	Sink/Source Input	
Rated Current	6.5 mA (24 VDC) (IN0, IN2, IN4, IN6) 5 mA (24 VDC) (Other input)	
Input Resistance	Approx. 3.7 KΩ (IN0, IN2, IN4, IN6) Approx. 4.7 KΩ (Other input)	
Input Derating	See <i>Input Derating, page 64</i>	
Input Points	16	
Common Lines	1	
Common Design	16 points/1 common line	
Operation Range	ON Voltage	19 VDC or more
	OFF Voltage	5 VDC or less
Input Delay Time ⁽¹⁾	OFF to ON	0.5 to 20ms ⁽²⁾
	ON to OFF	0.5 to 20ms ⁽²⁾
Input Signal Display	No LED indicators	
Status Display	None	
Isolation Method	Photocoupler Isolation	
External Connection	38-pin connector (used with Output section)	
External Power Supply	For Signal: 24 VDC	

⁽¹⁾ In the case of IN0, IN2, IN4, and IN6, the input delay time generates a 5μs-delay.
For example, in the case of a 0.5ms-cycle sampling:

$$5\mu\text{s} (\text{ON to OFF}) + 0.5\text{ms} (\text{sampling cycle}) + 5\mu\text{s} (\text{OFF to ON}) = 0.51\text{ms}$$

A minimum 0.51ms-restriction is imposed on the input pulse width.

In the case of IN1, IN3, IN5, and from IN7 to IN15, the input delay time generates a 0.5ms-delay.

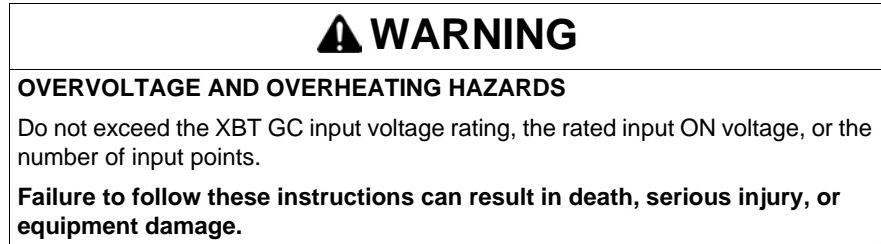
For example, in the case of a 0.5ms-cycle sampling:

$$0.5\text{ms} (\text{ON to OFF}) + 0.5\text{ms} (\text{sampling cycle}) + 0.5\text{ms} (\text{OFF to ON}) = 1.5\text{ms}.$$

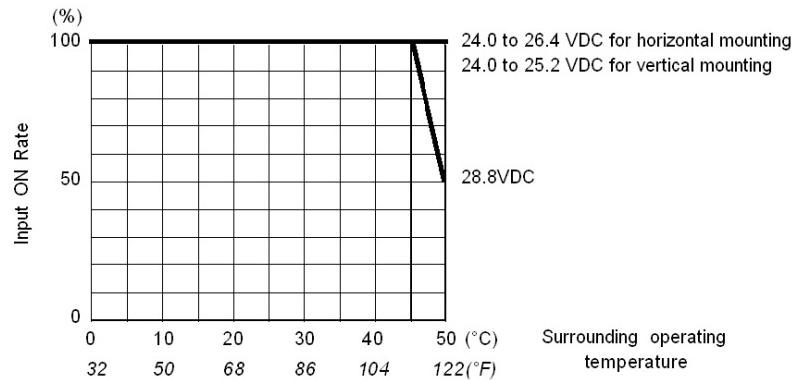
A minimum 1.5ms-restriction is imposed on the input-pulse width.

⁽²⁾ Digital filter can be set at intervals of 0.5 ms.

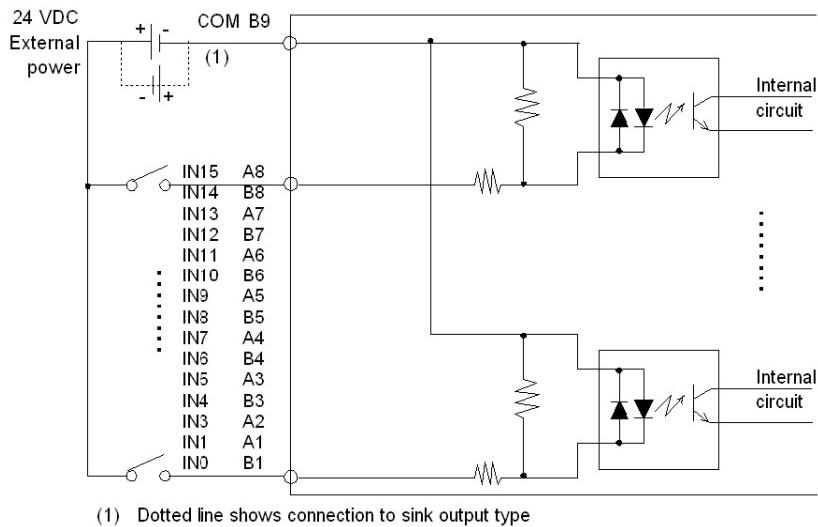
Input Derating



Refer to the following drawing and perform Input Derating within the XBT GC unit's rated range.



Input Circuit

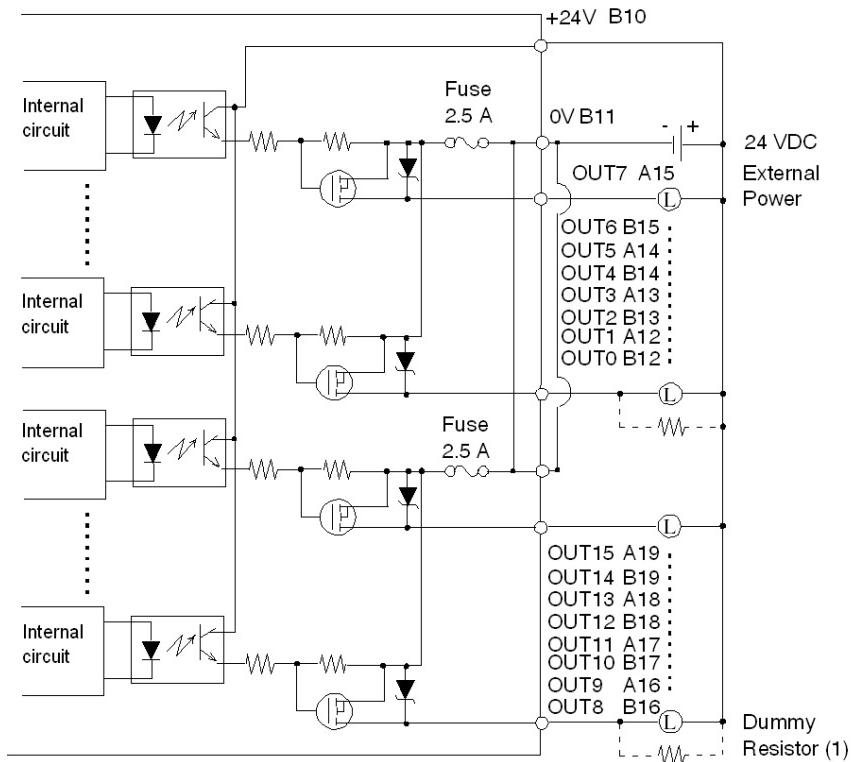


Output Specifications

Output Terminal		OUT0 to OUT3	OUT4 to OUT15
Rated Voltage		24 VDC	
Allowable Voltage Range		20.4...28.8 VDC	
Output Method	XBT GC2••0U	Sink Output	
	XBT GC2••0T	Source Output	
Maximum Load Voltage		0.2 A/point, 1.6 A/common	
Output Voltage Drop		0.5 VDC or less	
Output Delay Time	OFF to ON	5 µs or less (With output at 24 VDC, 200 mA)	0.5 ms or less (With output at 24 VDC, 200 mA)
	ON to OFF	5 µs or less (With output at 24 VDC, 200 mA)	0.5 ms or less (With output at 24 VDC, 200 mA)
Voltage Leakage (when OFF)		0.1 mA or less	
Clamp Voltage		39 V 1 V	
Type of Output		Transistor Output	
Common Lines		2	
Common Design		8 points/1 common line x 2	
External Connection		38-pin connector (also used for Input)	

Output Terminal	OUT0 to OUT3	OUT4 to OUT15
Output Protection Type	Output is unprotected	
Internal Fuse	2.5 A, 125 V Chip fuse (not replaceable)	
Surge Control Circuit	Zener diode	
Output Points	16	
Output Signal Display	No LED indicators	
Status Display Element	None	
Isolation Method	Photocoupler Isolation	
External Power Supply	For Signal: 24 VDC	

XBT GC2•0U Output Circuit (Sink type):



(1) (Example) The output delay time (OFF to ON) is 1.5 μ s where the output current is 24 VDC, 50 mA. Install an external dummy resistor to increase the amount of current when more responsiveness is required and the load is light.

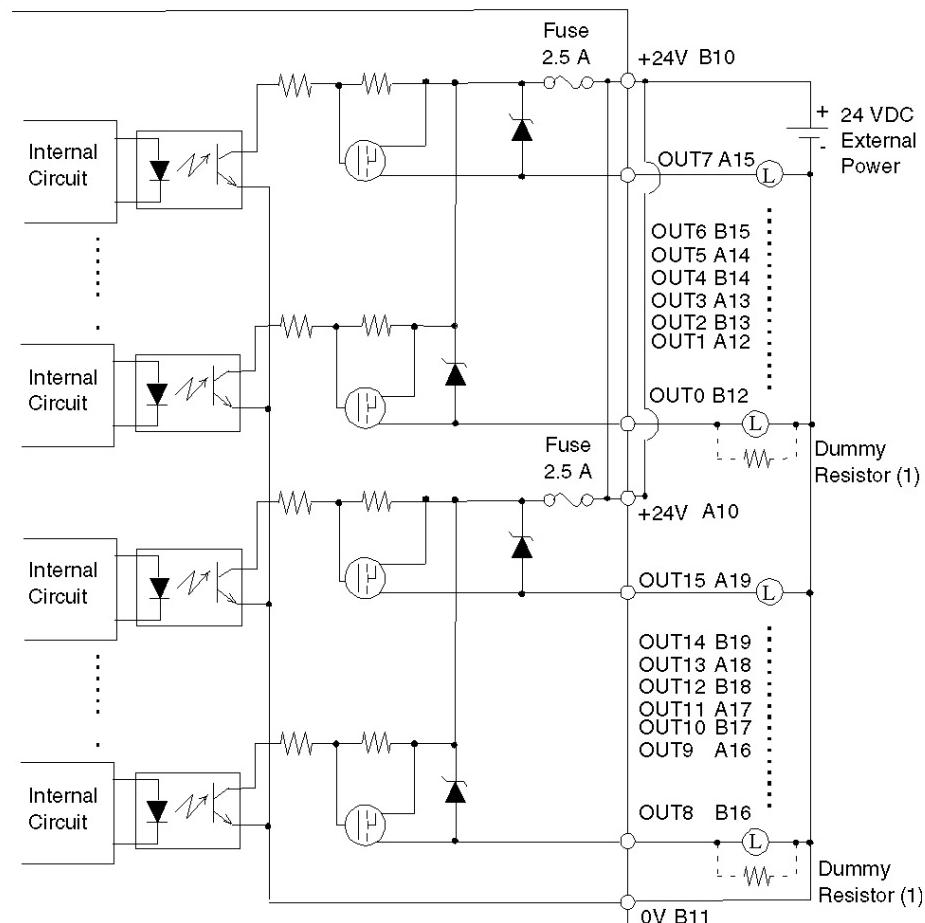
⚠ WARNING

OUTPUT SHORT CIRCUIT OR OVERVOLTAGE

Install an appropriate fuse (500 mA compliant with UL248-1) to protect the output line from an abnormal short-circuit or connection overload condition.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

XBT GC2•0T Output Circuit (Source type):



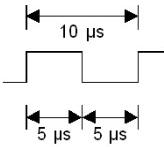
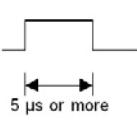
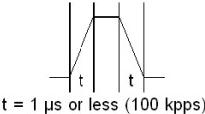
⁽¹⁾ (Example) The output delay time (OFF to ON) is 1.5 µs where the output current is 24 VDC, 50 mA. Install an external dummy resistor to increase the amount of current when more responsiveness is required and the load is light.

⚠ WARNING	
OUTPUT SHORT CIRCUIT OR OVERVOLTAGE	
Install an appropriate fuse (500 mA compliant with UL248-1) to protect the output line from an abnormal short-circuit or connection overload condition.	
Failure to follow these instructions can result in death, serious injury, or equipment damage.	

High-Speed Counter / Pulse Cath Input Specifications

DIO Standard Input/Output is used as a High-Speed Counter Input. The setup is done by the programming software. This function should be available from the second version of the Software.

For more information, refer to the programming software User Manual.

Characteristics	Counter	Pulse Catch
Input	24 VDC Open Collector	24 VDC Open Collector
	Single Phase (4 points) 2 Phase (1 point or 2 points)	
Input Points	CT0 (IN0), CT1 (IN2), CT2 (IN4), CT3 (IN6) CT0: A Phase, CT1: B Phase CT2 (IN4), CT3 (IN6) CT2: A Phase, CT3: B Phase	IN0, IN2, IN4, IN6
Min. Pulse Width (Pulse Input)		Input signal ON width 
Count Speed (Rise, Fall time)	 $t = 1 \mu s \text{ or less (100 kpps)}$	-

Characteristics	Counter		Pulse Catch
Phase	1 Phase	90 degree phase differential 2-phase signal 1 phase + directional signal	-
High Speed Count Frequency	100 Kpps	50 Kpps	-
Count Edge designation	Available	Not Available	-
Count Register	32 Bit UP/DOWN Counter		-
Counter Mode change	Set through software		-
Upper/Lower Limit Setting	Not Available		-
Preload - Prestrobe	Available		-
Marker Input (Counter Value Clear)	None	IN3, IN7	-

Pulse/PWM Output Specifications

DIO Standard Input/Output is used as a Pulser Output or PWM Output. The setup is done by the programming software. This function should be available from the second version of the Software.

For more information, refer to the programming software User Manual.

Characteristics	Pulse Output	PWM Output
Output Points	4 points	
Output Method	PLS0 to PLS3 (OUT0 to OUT3) defined by user	PWM0 to PWM3 (OUT0 to OUT3) defined by user
Load Voltage	24 VDC	
Min. Load Current	1 mA	
Max. Output Frequency	Up to 65 kHz possible per point (set through software)	
Pulse Acceleration/Deceleration Speed	Available	-
ON Duty	50% 10% (at 65 kHz) ⁽¹⁾	19 to 81% (at 65 kHz) ⁽²⁾

⁽¹⁾ The ON Duty error (10%) will be reduced if the Output frequency is low.

⁽²⁾ The ON Duty (effective range) will be widened if the Output frequency is low.

Wiring to the DIO Connector

Introduction

WARNING

ELECTRIC SHOCK

Be sure to remove the DIO Connector from the XBT GC unit prior to starting wiring.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Items Required to Wire Connectors

Screwdriver

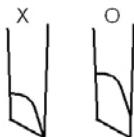
Recommended type: 1891348-1 (Tyco Electronics AMP)

If another manufacturer is used, be sure the part has the following dimensions:

- point depth: 1.5 mm (*0.06 in*)
- point height: 2.4 mm (*0.09 in*)

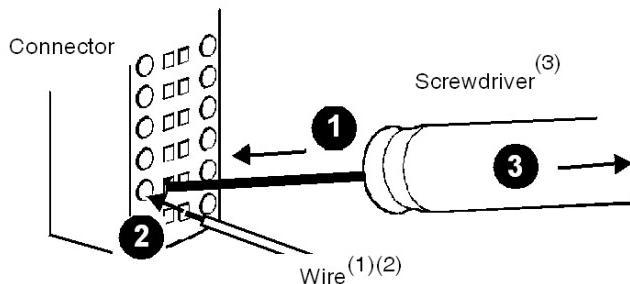
Point shape should be DIN5264A and meet Security Standard DN EN60900.

Also, the screwdriver's tip should be flat as indicated in order to access the narrow hole of the connector:



The connectors are a spring clamp type.

Procedure



(1) Wire should be AWG24 to AWG18 thick and twisted. Applicable wire sizes are UL1015 and UL1007.

(2) Be sure to strip at least 7.0 mm (0.28 in) of cover from the wire.

(3) Do not rotate the point of the screwdriver inside the square-shaped opening. It may damage the equipment.

Use the following procedure to connect the wires to the connectors:

Step	Action
1	Insert the screwdriver into the square-shaped hole. This will open the wire's round-shaped hole.
2	Hold the screwdriver and insert the wire into the wire's round-shaped hole.
3	Take out the screwdriver from the square-shaped hole. The round-shaped hole will then close, and the wire will be held securely in place.

NOTE: To remove the wire, re-insert the screwdriver into the square-shaped hole and when the wire's spring clamp releases, pull the wire out.

CAUTION

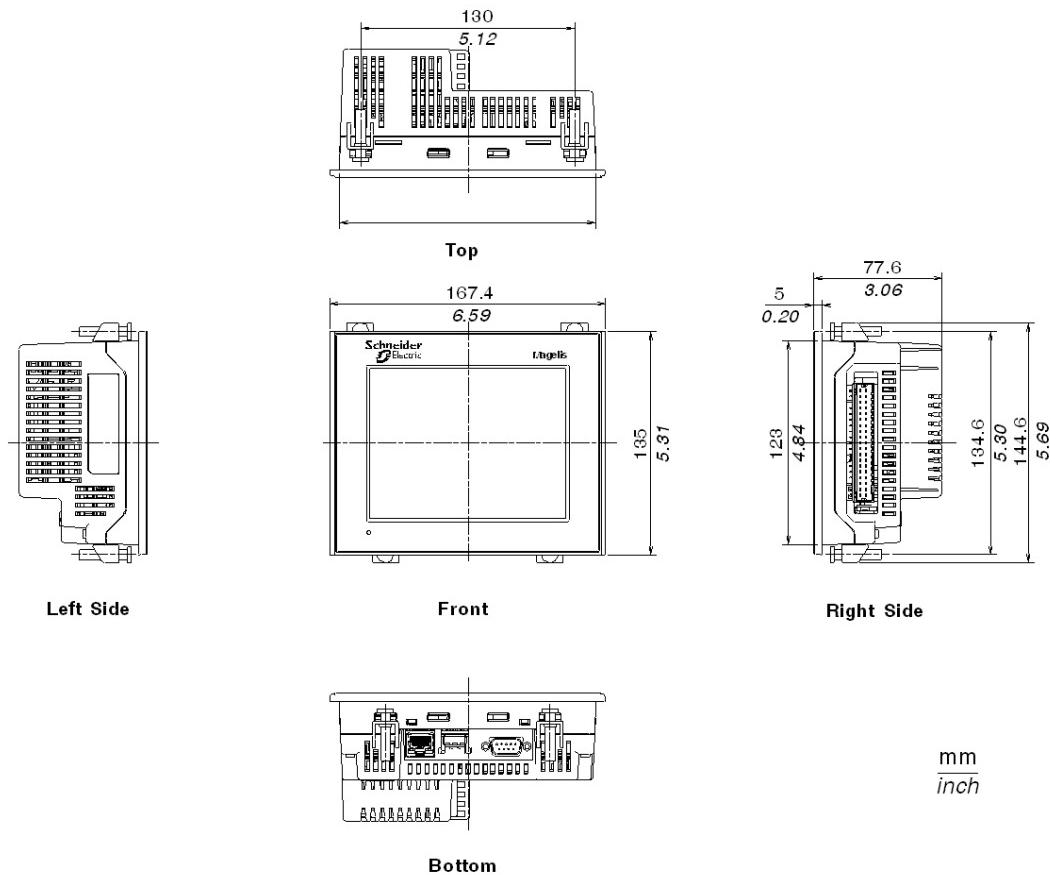
IMPROPER WIRING

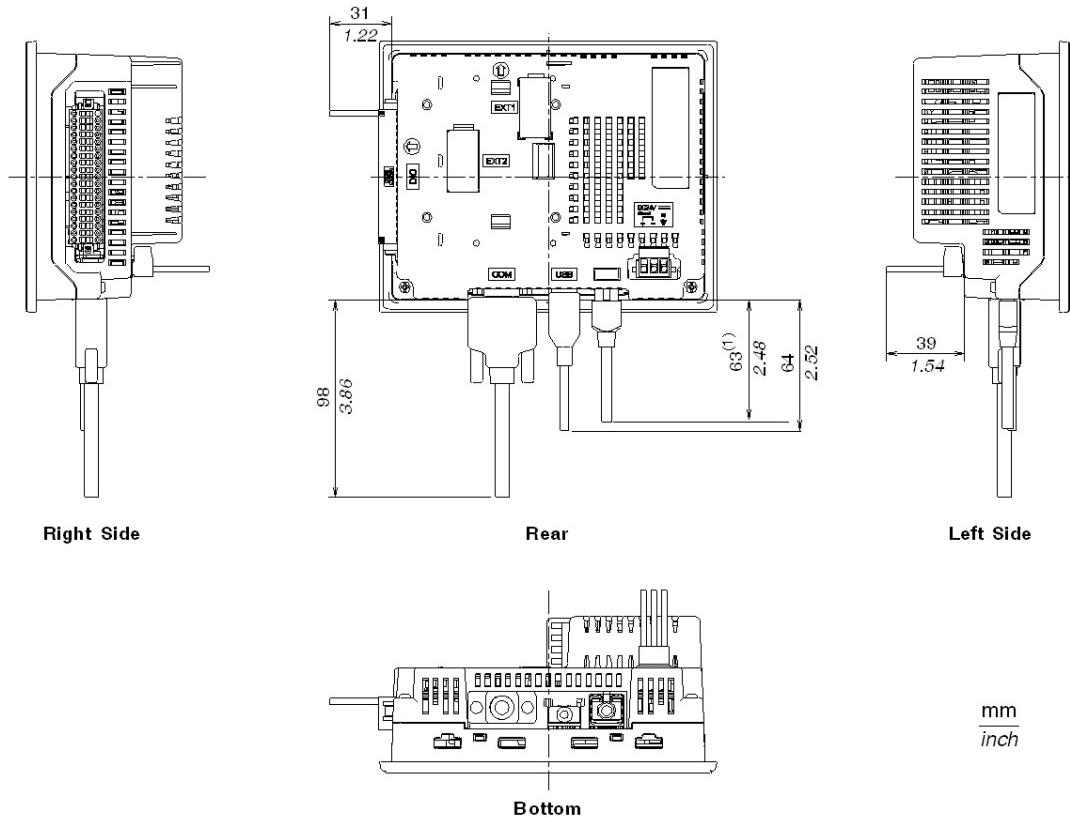
- Be sure to strip only the amount of cover required. If too much cover is removed, the end wires may short against each other or against an electrode, which can create an electric shock. If not enough cover is removed the wire cannot carry a charge.
- Do not solder the wire itself. This could lead to a bad or poor contact.
- Insert each wire completely into its opening. Failure to do so can lead to a unit malfunction or short, either against wire filaments, or against an electrode.

Failure to follow these instructions can result in injury or equipment damage.

XBT GC2000 Series Dimensions

Installation Fasteners Attached Dimensions

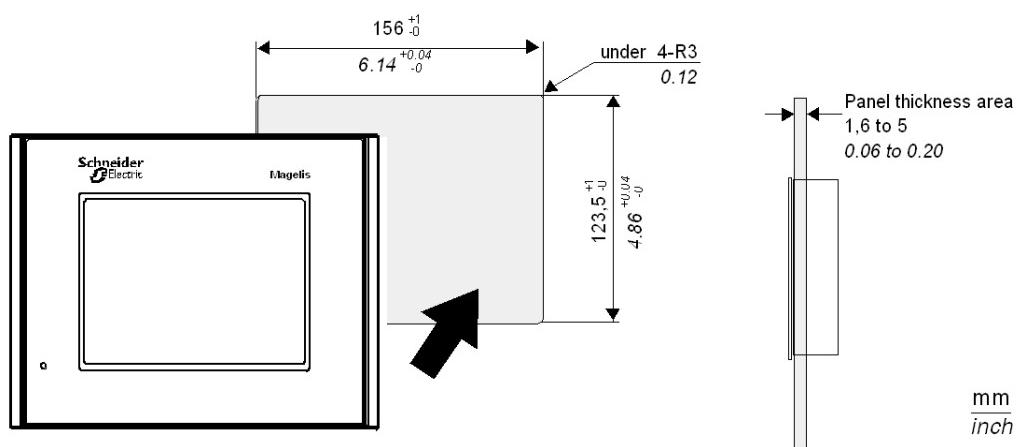


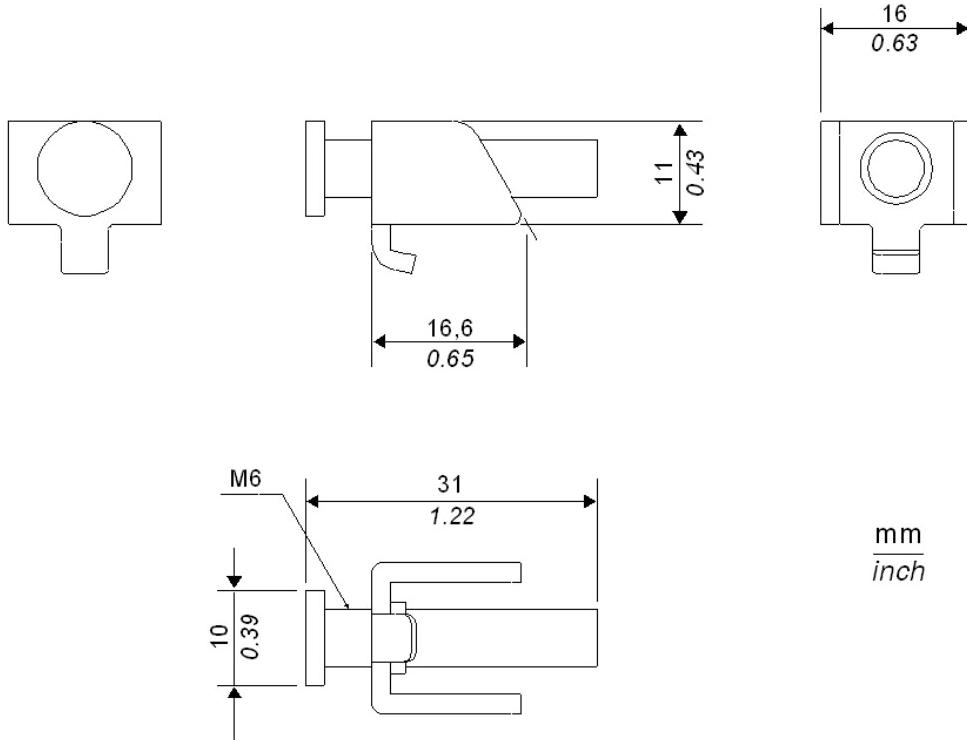
Cable Attached Dimensions

(1) The XBT GC2120• is not equipped with an Ethernet interface.

Important: All the above values are designed in case of cable bending. The dimensions given here are representative values depending on the type of connection cable used. Therefore, they are all intended for reference only.

Panel Cut Dimensions



Installation Fasteners

Sample of the Circuit Diagrams

3

3.1

Examples of Particular I/O Connections

Introduction

This section shows examples of connections between the XBT GC and a pulse motor amplifier or a rotary encoder.

What's in this Section?

This section contains the following topics:

Topic	Page
Connection to Pulse Motor Amplifier (CW/CCW type)	78
Connection to Pulse Motor Amplifier (Clock Up/Down System)	80
Connection to a Rotary Encoder	82

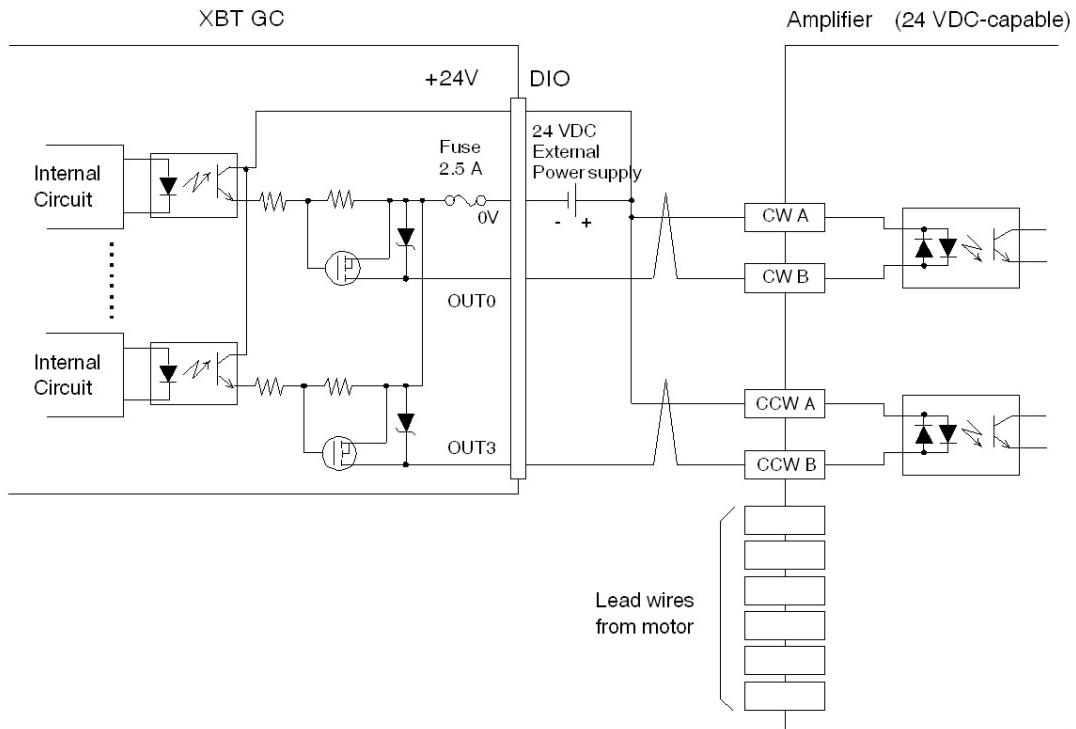
Connection to Pulse Motor Amplifier (CW/CCW type)

Presentation

The following circuit diagrams show examples of connections between the XBT GC and a pulse motor amplifier (when the transistor can be connected to the amplifier).

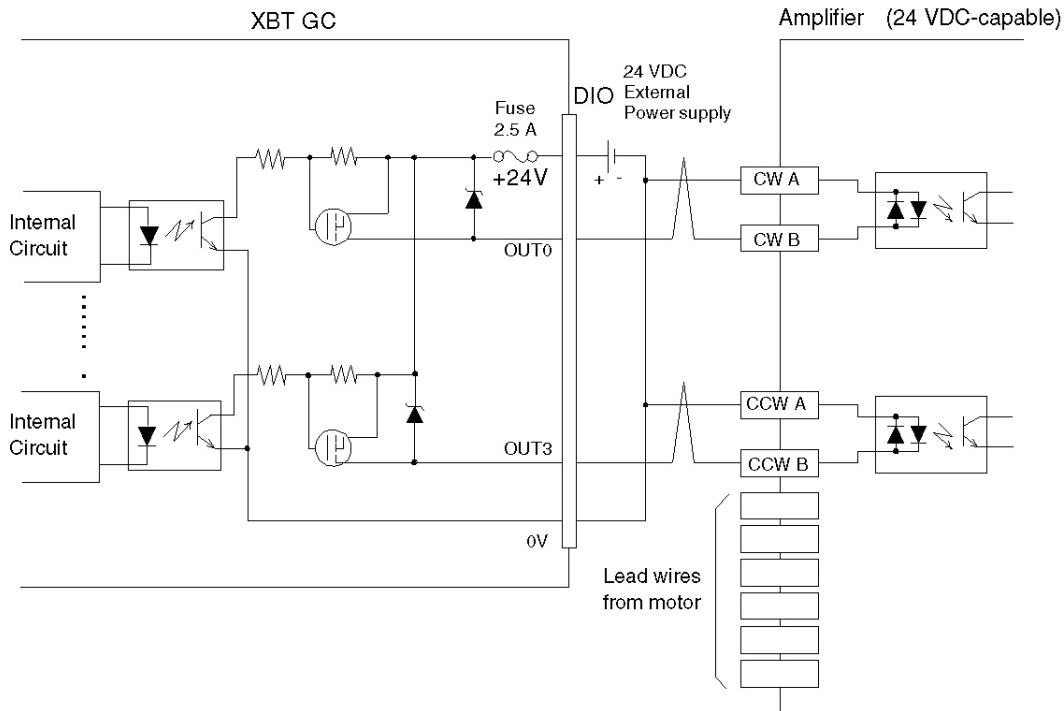
NOTE: The circuit of the pulse motor amplifier is illustrated by the 24 VDC CW and CCW concept. However, the withstand voltage and the operating current of the coupler, which receives pulse signals, vary by manufacturer. Please contact the amplifier manufacturer before using.

Output Sink Type



NOTE: The output terminals for XBT GC pulses are the ones that have the signal names OUT0, OUT1, OUT2, and OUT3. For setting details, refer to the programming software online help.

Output Source Type



NOTE: The output terminals for XBT GC pulses are the ones that have the signal names OUT0, OUT1, OUT2, and OUT3. For setting details, refer to the programming software online help.

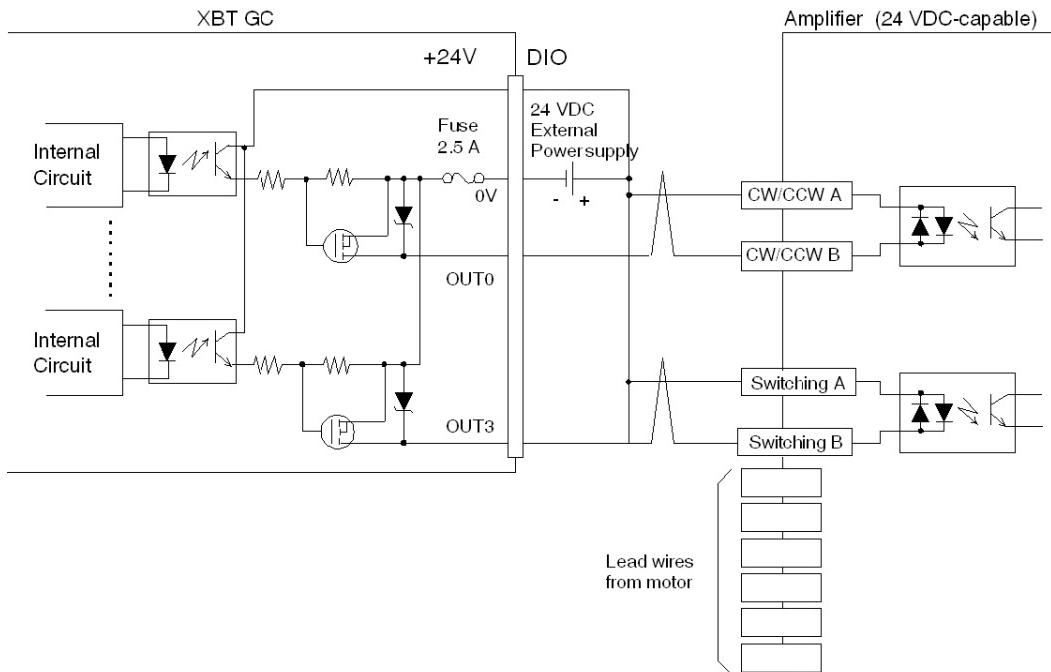
Connection to Pulse Motor Amplifier (Clock Up/Down System)

Presentation

The following circuit diagrams show examples of connections between the XBT GC and a pulse motor amplifier (when the transistor can be connected to the amplifier).

NOTE: The circuit of the pulse motor amplifier is illustrated by the 24 VDC clock up/down system. However, the withstand voltage and the operating current of the coupler, which receives pulse signals, vary by manufacturer. Please contact the amplifier manufacturer before using.

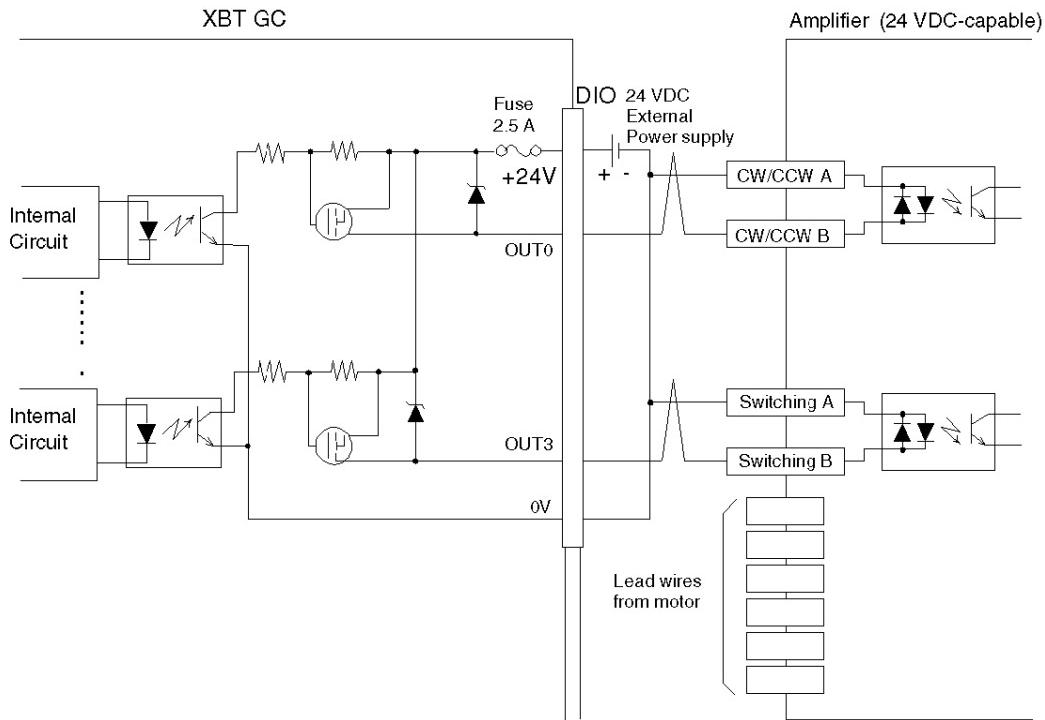
Output Sink Type



NOTE:

- The output terminals for XBT GC pulses are the ones that have the signal names OUT0, OUT1, OUT2, and OUT3. For setting details, refer to the programming software online help.
- Output signals for switching do not have to be connected to terminals that accommodate high-speed output, and can be connected to general-purpose terminals (XBT GC1000 series: OUT 4 and OUT5, XBT GC2000 series: OUT4 through OUT15).

Output Source Type



NOTE:

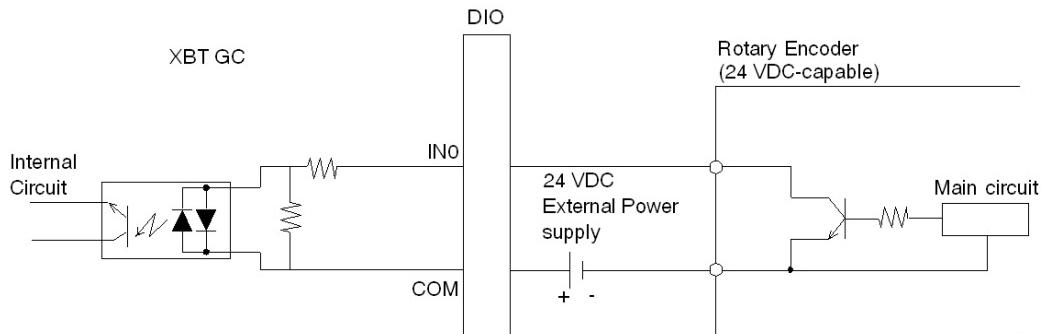
- The output terminals for XBT GC pulses are the ones that have the signal names OUT0, OUT1, OUT2, and OUT3. For setting details, refer to the programming software online help.
- Output signals for switching do not have to be connected to terminals that accommodate high-speed output and can be connected to general-purpose terminals (XBT GC1000 series: OUT 4 and OUT5, XBT GC2000 series: OUT4 through OUT15).

Connection to a Rotary Encoder

Presentation

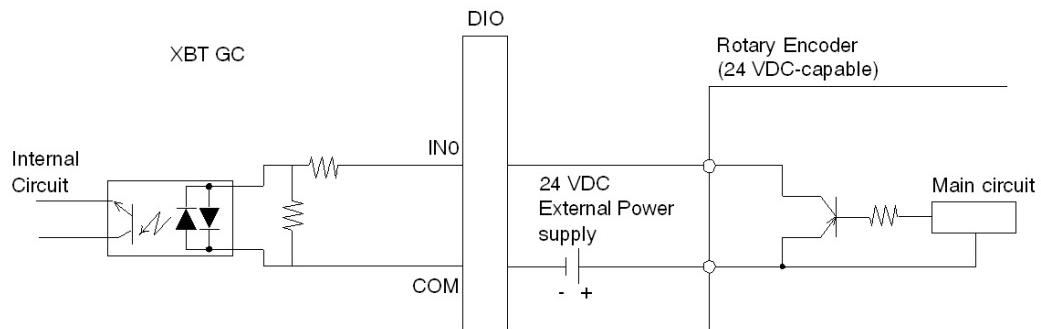
The following circuit diagrams show examples of connections between the XBT GC and a rotary encoder (when the transistor can be connected to the rotary encoder).

Output Sink Rotary Encoder



NOTE: The output terminals for LT counters are the ones that have the signal names IN0, IN2, IN4, and IN6. For setting details, refer to the programming software online help.

Output Source Rotary Encoder



NOTE: The output terminals for XBT GC counters are the ones that have the signal names IN0, IN2, IN4, and IN6. For setting details, refer to the programming software online help.

Installation and Wiring

4

Introduction

This chapter describes the installation and wiring of XBT GC Series units.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
4.1	Installation	84
4.2	Wiring Precautions	89
4.3	Telefast Cables	102
4.4	USB Cable Clamp Attachment/Removal	108

4.1 Installation

Installation

Check the Installation Gasket's Seating

It is strongly recommended that you use the installation gasket since it absorbs vibration in addition to repelling water.

For the procedure for attaching the installation gasket, see *Installation Gasket Attachment Procedure*, page 119.

Important:

- Before installing the XBT GC into a cabinet or panel, check that the installation gasket is securely attached to the unit.
- A gasket which has been used for a long period of time may have scratches or dirt on it and could have lost much of its dust and drip resistance. Be sure to change the gasket periodically (or when scratches or dirt become visible).

Creating a Panel Cut

Create the correct sized opening required to install the XBT GC, using the installation dimensions given.

Determine the panel thickness according to the panel thickness range with due consideration of panel strength.

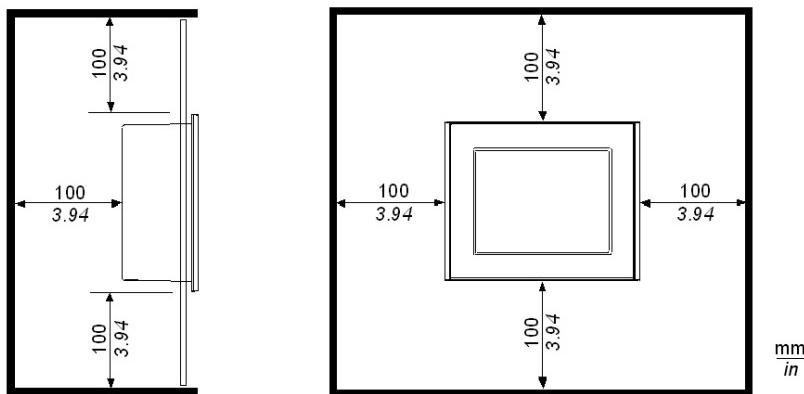
See:

- XBT GC1000 Series: see *Panel Cut Dimensions*, page 50
- XBT GC2000 Series: see *Panel Cut Dimensions*, page 74

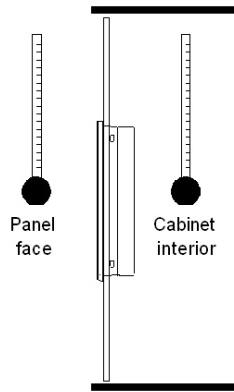
NOTE: Check that the installation panel or cabinet's surface is flat, in good condition and has no jagged edges. Also, if desired, metal reinforcing strips can be attached to the inside of the panel, near the Panel Cut, to increase the panel's strength.

Installation Requirements

For easier maintenance, operation and improved ventilation, be sure to install the XBT GC at least 100 mm (3.94 in) away from adjacent structures and other equipment:

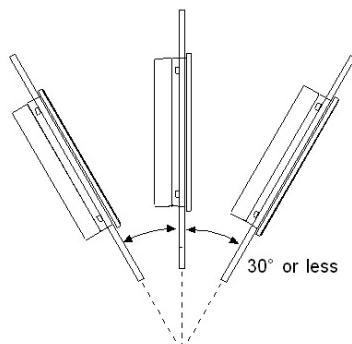


Be sure that the surrounding air temperature and the ambient humidity are within their designated ranges. (Surrounding air temperature: 0 to 50°C (32 to 122°F), Ambient humidity: 10 to 90% RH, Wet bulb temperature: 39°C (102.2°F) max.). When installing the XBT GC on the panel of a cabinet or enclosure, "Surrounding air temperature" indicates both the panel face and cabinet or enclosure's internal temperature:



Be sure that heat from surrounding equipment does not cause the XBT GC to exceed its standard operating temperature.

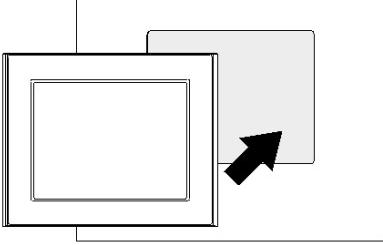
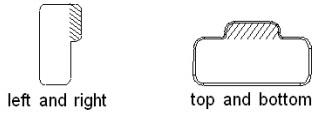
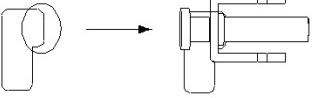
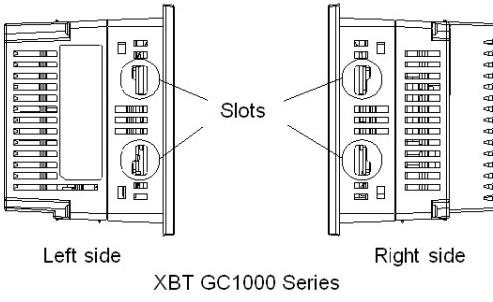
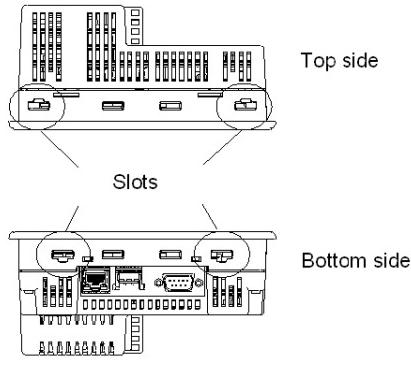
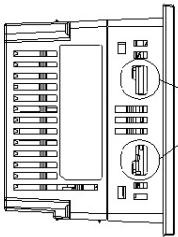
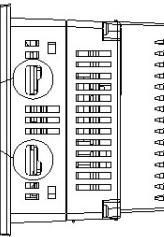
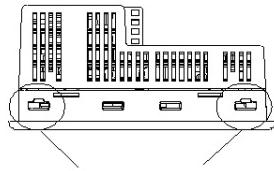
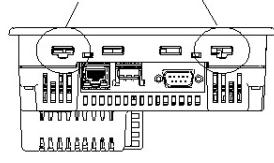
When installing the XBT GC in a slanted panel, the panel face should not incline more than 30°:

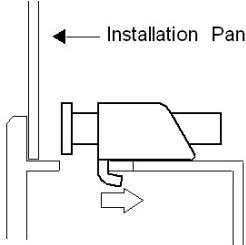
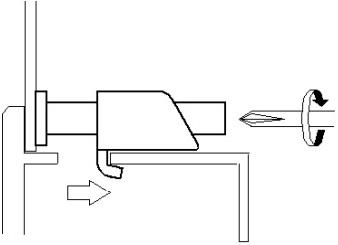


- When installing the XBT GC in a slanted panel, and the panel face inclines more than 30°, the surrounding operating temperature must not exceed 40°C (104°F). You may need to use forced air cooling (fan, A/C) to ensure the surrounding operating temperature is 40°C (104°F) or below.
- The XBT GC1000 series does not support portrait mounting. When the XBT GC2000 series is used with the EX module attached to the rear side, it cannot be mounted in portrait orientation.

Installing the XBT GC

Installation procedure:

Step	Action	Description
1	Insert the XBT GC into the panel cut.	
2	<p>Insert the installation fasteners into the XBT GC insertion slots, at the left and right side or top and bottom side of the unit. (total: 4 slots)</p> <p>Important: Insert each installation fastener securely into the slot's recess (shaded area). If the fasteners are not correctly attached, the XBT GC unit may shift or fall out of the panel</p>  <p>Example XBT GC1000 Series:</p>  <p>XBT GC1000 Series:</p>  <p>XBT GC2000 Series:</p> 	  <p>Left side Right side</p> <p>XBT GC1000 Series</p>   <p>Top side Bottom side</p> <p>XBT GC2000 Series</p>

Step	Action	Description
3	Insert each of the fasteners shown below. Be sure to pull the fastener back until it is flush with the rear of the attachment hole.	
4	<p>Use a Phillips screwdriver to tighten each fastener screw and secure the XBT GC in place.</p> <p>Important:</p> <ul style="list-style-type: none">• Tightening the screws with too much force can damage the XBT GC unit's plastic case.• The torque required to tighten these screws is 0.5 Nm (4.4 lb-in).	

4.2 Wiring Precautions

Introduction

This section describes the procedures and precautions for wiring.

What's in this Section?

This section contains the following topics:

Topic	Page
Connecting the Power Cord	90
Connecting the Power Supply	93
Grounding	95
Wiring Precautions	97
Installation Precautions	98

Connecting the Power Cord

Presentation

This section describes the procedures and precautions for wiring power cords.

WARNING

ELECTRIC SHORT CIRCUIT OR OVERVOLTAGE

- Prior to connecting the XBT GC unit's power cord terminals to the power terminal block, confirm that the XBT GC unit's power supply is completely turned OFF.
- Supplying a power voltage other than that specified will damage the power source and the XBT GC unit.
- Since there is no power switch on the XBT GC unit, be sure to attach a switch to its power cord.
- When the FG terminal is connected, be sure the wire is grounded.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

CAUTION

IMPROPER GROUNDING

- When the FG terminal is connected, be sure the wire is grounded. Not grounding the XBT GC unit will result in excess noise and vibration.
- The SG and FG terminals are connected internally in the XBT GC unit. When connecting the SG wire to another device, be sure that the design of the system/connection does not produce a ground loop.

Failure to follow these instructions can result in injury or equipment damage.

When the DC Type

Power Cord Specifications:

Characteristic	Specification
Power Cord Diameter	0.75...2.5 mm ² (18...12 AWG)
Conductor Type	Simple or twisted wire
Conductor Length	<p>7 mm (0.28 in)</p>

Important:

- Use copper conductors only.
- If the Conductor's end (individual) wires are not twisted correctly, the end wires may either short against each other, or against an electrode.

Power Connector (Plug) Specifications:

Illustration	Signal	Description
<p>+ → - → FG →</p> <p>Insertion Direction →</p>	+	24 VDC
	-	0 V
	FG	FG Grounding terminal connected to the XBT GC

Connecting the Power Cord

Important:

- Be sure to remove the connector from the XBT GC unit prior to starting wiring.
- The temperature rating of field installed conductors: 75°C (167°F) only.

Procedure:

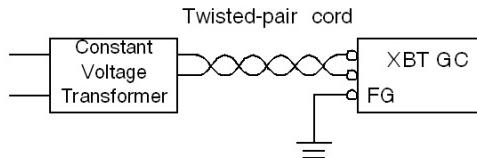
Step	Action
1	Confirm that the power cord is unplugged from the power supply.
2	<p>Strip the membrane of the power cord, twist the wire ends and connect them to the Power Connector (Plug).</p> <p>Important:</p> <ul style="list-style-type: none"> • Use a flat-blade screwdriver (Size 0.6 X 3.5) to tighten the terminal screws. The torque required to tighten these screws is 0.5...0.6 Nm (4.4...5.3 lb-in). • Do not solder the cable connection.
3	<p>Reattach the Power Connector (Plug):</p> <p>Power connector (socket)</p> <p>Bottom</p> <p>Power connector (plug)</p> <p>Note: Be sure to twist the power cords together, up to the power connector.</p>

Connecting the Power Supply

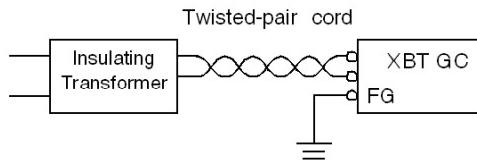
Presentation

This section describes the precautions for supplying a power voltage.

If the supplied voltage exceeds the XBT GC unit's range, connect a constant voltage transformer (see *Specifications, page 29*):

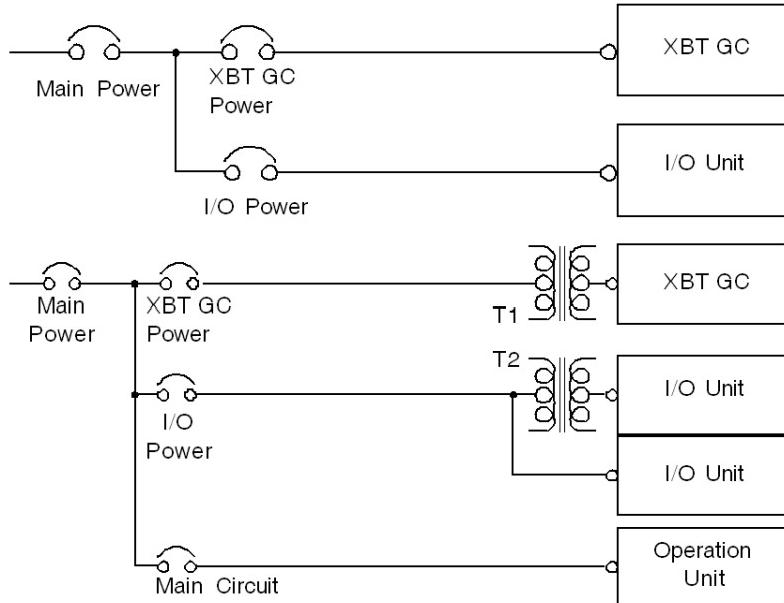


For between the line and ground, select a power supply that is low in noise. If there is an excess amount of noise, connect a insulating transformer:



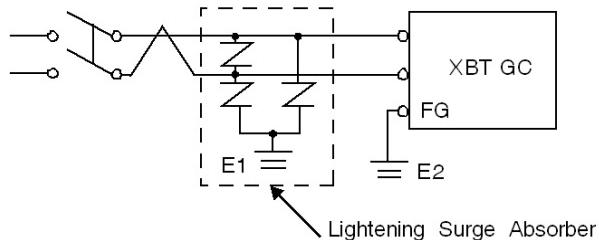
Important: Use constant voltage and insulating transformers with capacities exceeding Power Consumption value.

When supplying power to the XBT GC unit, be sure to separate the input/output and power lines, as shown.



- To increase the noise resistance quality of the power cord, simply twist each power wire before attaching the Ring Terminal.
- The power supply cable must not be bundled or positioned close to main circuit lines (high voltage, high current) or input/output signal lines.
- To avoid excess noise, make the power cord as short as possible.
- 24 VDC input unit is must be used with a Class 2 power supply.

Connect a lightening surge absorber, as shown in the diagram, to deal with power surges:



Important:

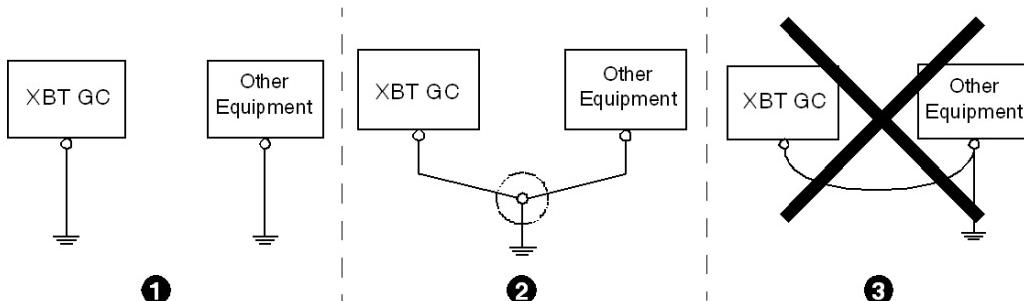
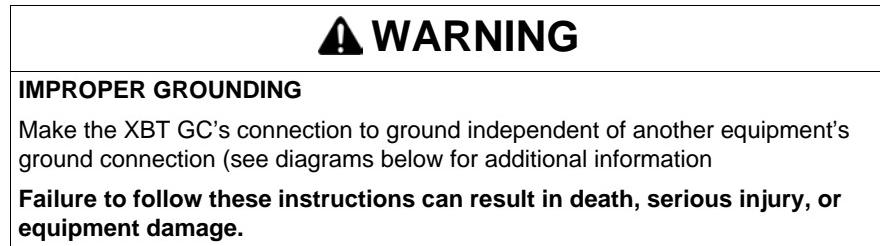
- Be sure to ground the surge absorber (E1) separately from the XBT GC unit (E2).
- Select a surge absorber that has a maximum circuit voltage greater than that of the peak voltage of the power supply.

Grounding

Presentation

This section describes the precautions for grounding the XBT GC unit.

Grounding



Label	Description
1	Exclusive Grounding: BEST
2	Exclusive Grounding: OK
3	Common Grounding: NOT OK

CAUTION

IMPROPER GROUNDING

Important:

- Check that the grounding resistance is 100 Ω or less.
- FG and SG terminals are internally connected in the XBT GC. When connecting an external device to the XBT GC using the SG terminal, be sure to check that no short-circuit loop is created when you setup the system.
- The grounding wire should have a cross sectional area greater than 2 mm² (AWG 14). Create the grounding point as close to the XBT GC unit as possible, and make the wire as short, as possible. When using a long grounding wire, replace the thin wire with a thicker wire and place it in a duct.
- If exclusive grounding is not possible, use a common grounding point (diagram 2). A grounding or equivalent should be used for the grounding point.

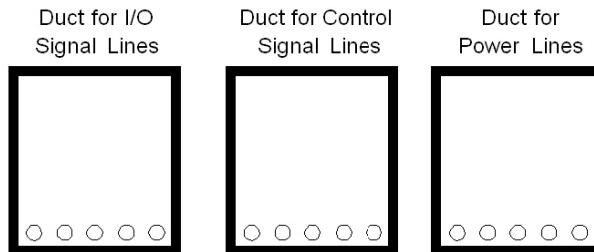
Failure to follow these instructions can result in injury or equipment damage.

NOTE: If the equipment does not function properly when grounded, disconnect the ground wire from the FG terminal.

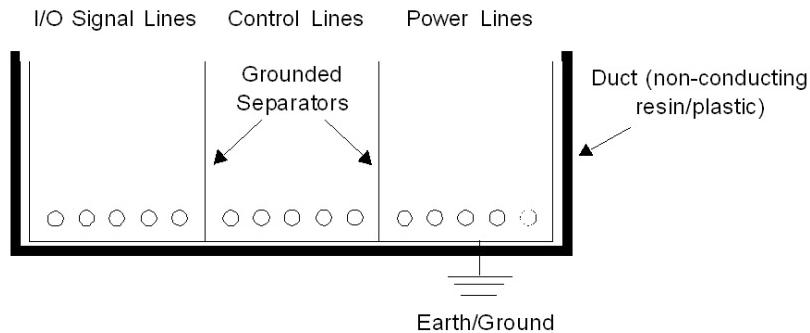
Wiring Precautions

Presentation

To help prevent noise and interference problems, separate all control, communication and power lines by placing them in a separate ducts:



If different wires must be placed in the same duct, separate them with an earthed/grounded divider:



NOTE: If the lines cannot be separated, use shielded lines and create a ground from the shield line.

Important:

- Use noise-reducing external wiring methods to increase overall system reliability.
- To prevent power surges or electromagnetic interference, use ducts to separate all DC I/O or current circuit wires from communication cables.
- To help avoid electromagnetic interference, communication cables must be wired separately from high-frequency lines and power lines such as high-voltage lines, high-current lines and inverters.

Installation Precautions

Presentation

External power cut-off or unexpected stop of the XBT GC unit may cause abnormal behavior.

⚠ WARNING	
UNINTENDED EQUIPMENT OPERATION	
Configure circuits involved in personnel safety (emergency stop circuits, protection circuits, interlock circuits, etc.) externally to the XBT GC.	
Failure to follow these instructions can result in death, serious injury, or equipment damage.	

This section describes examples of the system circuit design to improve system reliability and performance.

Control System Best Practices

In the design of a control system, consider any potential power-up delays for the different components in the system. Create a program which checks the status of the XBT GC unit. When remote I/O is used, create a program that checks the status of the terminal with a logic program.

For example, connect voltage relay coils to the power supply circuit of the XBT GC output unit and the power supply circuit of the connected control equipment, and connect the contact to the XBT GC input unit. Configure the circuit to check the ON signal from the voltage relay in the logic program before executing the ladder of the control equipment connected to the XBT GC output unit.

Rated Voltage

Be sure to supply an appropriate power supply voltage to your XBT GC that is within the specified range.

Power-down

XBT GC unit enters power-down status when an instantaneous power interruption of the rated voltage continues for 10ms or longer.

When the XBT GC unit enters power-down status, it stops the calculation even if the instruction is not finished.

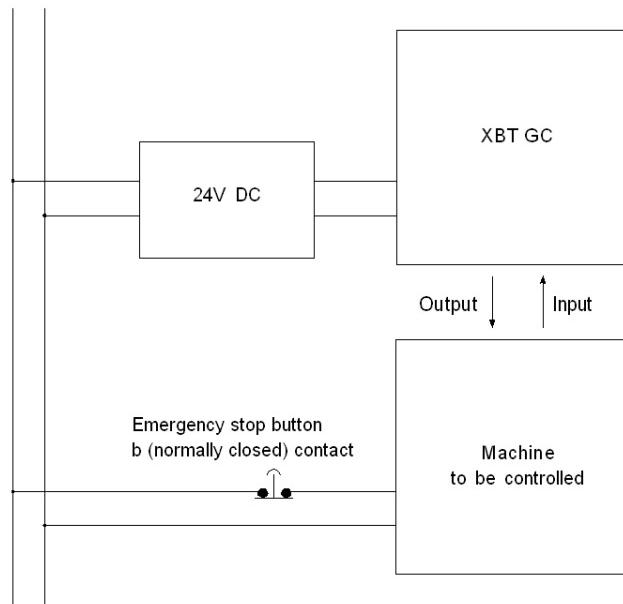
For example, when the XBT GC unit enters power-down status while 100 words of data are being transferred by an FMOV instruction, the transfer stops midway.

Consequently, design your program with consideration to power-down occurrences.

Emergency Stop Circuit

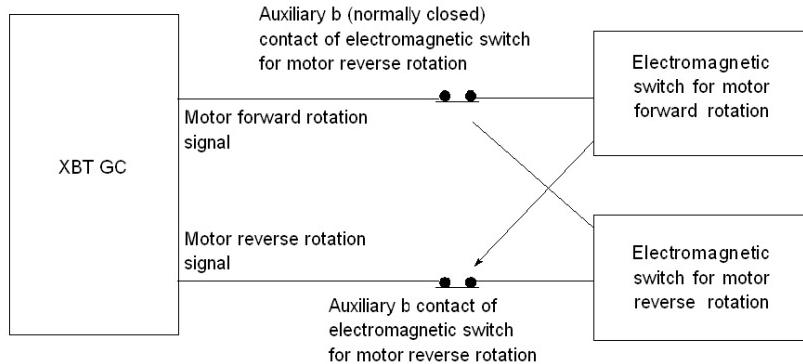
Do not process emergency stop signals with a software program by inputting the signal to the XBT GC.

Configure the emergency stop circuit externally to the XBT GC as shown in the figure below:



Interlock Circuit 1

To use the XBT GC or a PLC to control a motor circuit for forward/reverse rotation, configure the interlock circuit shown below externally to the XBT GC.



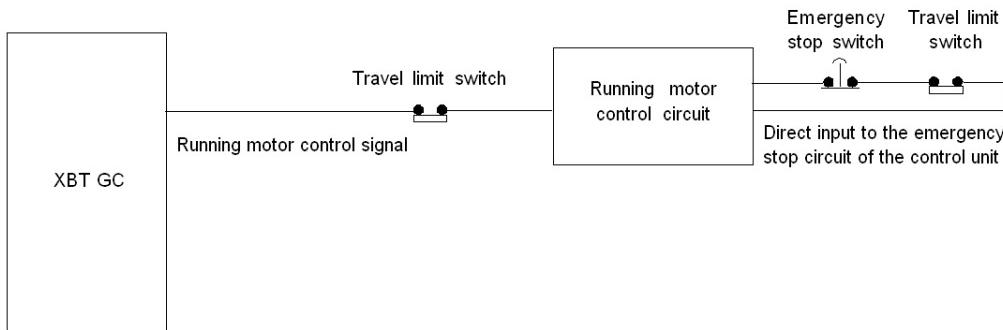
NOTE: After executing an internal program, the XBT GC outputs ON/OFF information to the output devices at the same time. For example, the electromagnetic switches for forward and reverse rotation of a motor are turned on and off at the same time. Consequently, a situation may arise in which both of the main contacts of the motor circuits for the electromagnetic switches for forward and reverse rotation may turn on, causing a short-circuit of the R and T phases. To avoid this situation, you need to provide the interlock circuit shown above or use an electromagnetic switch equipped with a mechanical interlock for a forward/reverse circuit.

Interlock Circuit 2

If there is a possibility that the abnormal operation of the XBT GC may lead to an accident, design a fail-safe measure to configure an interlock circuit with external hardware devices.

For a system which requires the running motor to stop before all other processes when the travel limit switch is activated, never design a system in which the signals from the travel limit switch are input to the input terminals of the XBT GC and then processed using software.

Configure a circuit that reliably stops the running motor using hardware as shown below:



4.3 Telefast Cables

Telefast Cables

Presentation

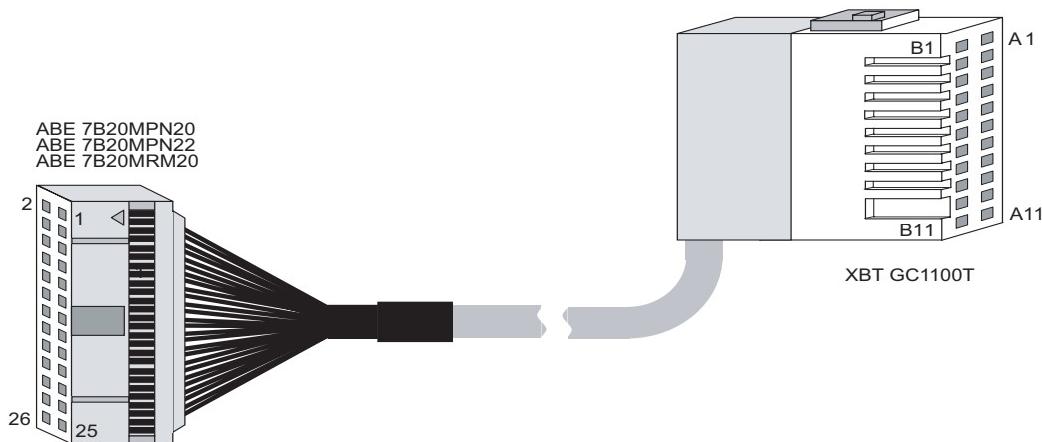
This table shows the compatibility of Telefast modules and XBT GC units.

Telefast Module Description			XBT GC1000T Series		XBT GC2000T Series	
Type	Channel	Reference	12 Inputs	6 Outputs Source	16 Inputs	16 Outputs Source
Passive Sub-bases	20	ABE 7B20MPN2•	X ⁽¹⁾		-	-
	16	ABE 7E16EPN20	-	-	X	-
		ABE 7E16SPN2•	-	-	-	X
Output adapter bases	20	ABE 7B20MRM20	X ⁽²⁾		-	-
	16	ABE 7E16SRM20	-	-	-	X
Cable Reference	-	XBT ZGABE1	X		-	X
	-	XBT ZGABE2	-	-	X	

(1) 6 channels used for 8 available

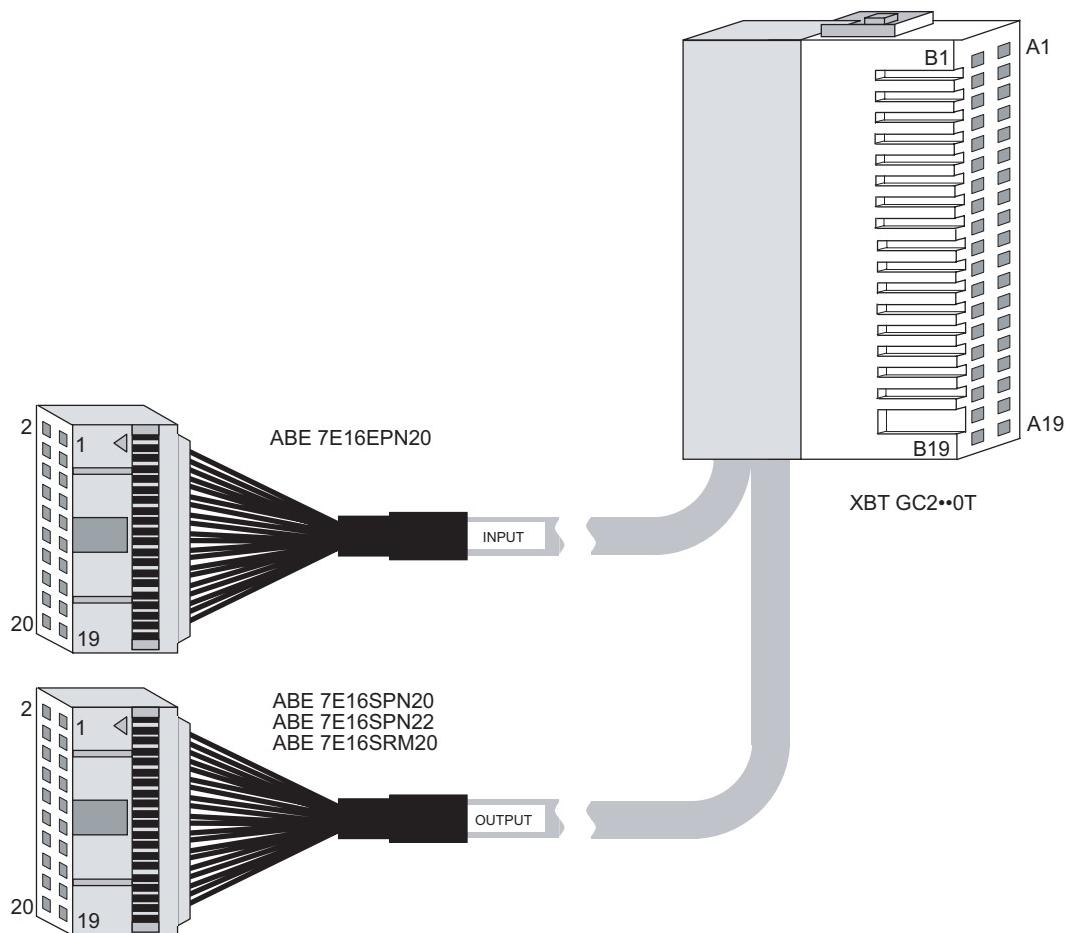
(2) 6 channels used for 8 available with 2 transistor outputs and 4 relay outputs

NOTE: The Telefast cables and modules are not compatible with sink type XBT GC units (U suffix).

XBT ZGABE1 Cable

XBT GC1100T		ABE 7B20MPN20 (12I Source + 8O Passive source) ABE 7B20MRM20 (12I Source + 6O Relay + 2O Transistor)
DIO connector - Female 22 pins		HE10 connector - Female 26 pins
I0	B1	26
I1	A1	24
I2	B2	22
I3	A2	20
I4	B3	18
I5	A3	16
I6	B4	14
I7	A4	12
I8	B5	10
I9	A5	8
I10	B6	6
I11	A6	4
I com	B7	3 (0 V)
Q0	B9	25 (S0)
Q1	A9	23 (S1)
Q2	B10	21

XBT GC1100T		ABE 7B20MPN20• (12I Source + 8O Passive source) ABE 7B20MRM20 (12I Source + 6O Relay + 2O Transistor)
DIO connector - Female 22 pins		HE10 connector - Female 26 pins
Q3	A10	19
Q4	B11	17
Q5	A11	15
+24V	B8	5 (+24V)
0V	A8	1 (0V)

XBT ZGABE2 Cable

XBT GC2•0T		ABE 7E16EPN20 (16I Source - 16O Passive source)	ABE 7E16SPN2• (16O Passive source) ABE 7E16SRM20 (16O Relay)
DIO connector Female - 38 pins		Input connector Female HE10 - 20 pins	Output connector Female HE10 - 20 pins
I0	B1	20	-
I1	A1	18	-
I2	B2	16	-

XBT GC2•0T		ABE 7E16EPN20 (16I Source - 16O Passive source)	ABE 7E16SPN2• (16O Passive source) ABE 7E16SRM20 (16O Relay)
DIO connector Female - 38 pins		Input connector Female HE10 - 20 pins	Output connector Female HE10 - 20 pins
I3	A2	14	-
I4	B3	12	-
I5	A3	10	-
I6	B4	8	-
I7	A4	6	-
I8	B5	19	-
I9	A5	17	-
I10	B6	15	-
I11	A6	13	-
I12	B7	11	-
I13	A7	9	-
I14	B8	7	-
I15	A8	5	-
I com	B9	4 (0V)	-
Q0	B12	-	20
Q1	A12	-	18
Q2	B13	-	16
Q3	A13	-	14
Q4	B14	-	12
Q5	A14	-	10
Q6	B15	-	8
Q7	A15	-	6
Q8	B16	-	19
Q9	A16	-	17
Q10	B17	-	15
Q11	A17	-	13
Q12	B18	-	11
Q13	A18	-	9
Q14	B19	-	7
Q15	A19	-	5

XBT GC2**0T		ABE 7E16EPN20 (16I Source - 16O Passive source)	ABE 7E16SPN2• (16O Passive source) ABE 7E16SRM20 (16O Relay)
DIO connector Female - 38 pins		Input connector Female HE10 - 20 pins	Output connector Female HE10 - 20 pins
+24V	A10	-	3 (+24V)
+24V	B10	-	4 (+24V)
0V	B11	-	1 (0V)

4.4 USB Cable Clamp Attachment/Removal

Introduction

This clamp is used to prevent the USB cable connected to the USB Host Interface on the bottom of the XBT GC unit from being unplugged due to vibration or other causes.

Important: When the USB Host Interface is used in the hazardous locations specified in UL1604, use the USB holder to secure the USB cable. The USB Host Interface cannot be used unless the connectors attached to the XBT GC unit and connected device are completely secured to prevent disconnection.

What's in this Section?

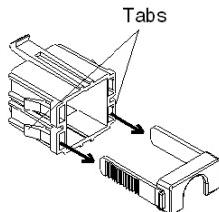
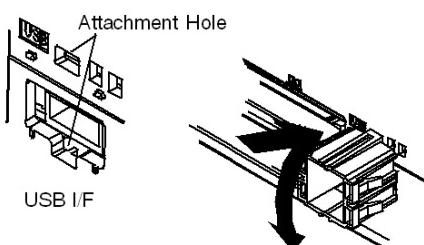
This section contains the following topics:

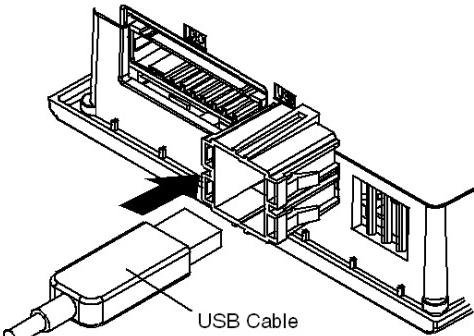
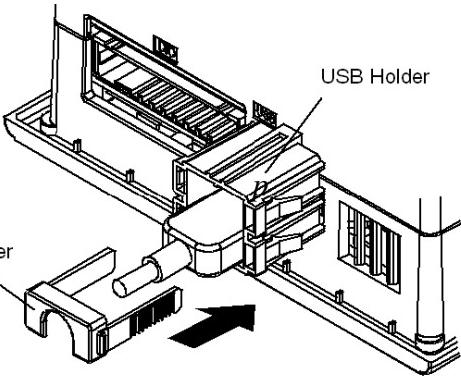
Topic	Page
XBT GC1000 Series: USB Cable Clamp	109
XBT GC2000 Series: USB Cable Clamp	111

XBT GC1000 Series: USB Cable Clamp

Attachment

Procedure:

Step	Action
1	<p>Before starting the procedure, orient the two tabs on both sides of the USB Holder in the direction of the arrows in the figure and remove the USB Cover:</p>  <p>The diagram shows a side view of a rectangular USB holder. Two small triangular 'Tabs' are visible on the left and right edges. Arrows point from the word 'Tabs' to these features. Below the holder is a separate, smaller rectangular component labeled 'USB Cover'.</p>
2	<p>With the main unit display part positioned so that it is facing down, attach the USB holder to the USB host interface. Do this by inserting the picks on the USB holder itself into the attachment holes on the main unit. Insert the upper hook first:</p>  <p>The diagram consists of two parts. On the left, a small illustration shows a 'USB I/F' port on a main unit with several small rectangular 'Attachment Hole' cutouts. On the right, a larger illustration shows the USB holder being rotated and lowered onto these holes, with a curved arrow indicating the insertion motion.</p>

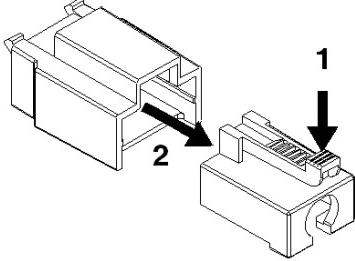
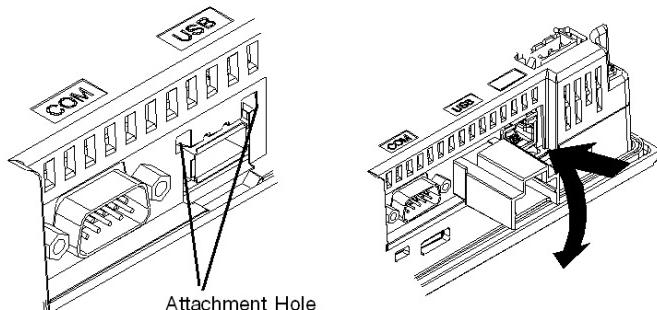
Step	Action
3	<p>Insert the USB cable into the USB Host Interface:</p>  <p>The diagram shows a perspective view of a rectangular electronic device. A slot on the left side is labeled "USB Host Interface". A black arrow points from a separate "USB Cable" towards this slot, indicating the direction of insertion.</p>
4	<p>Attach the USB cover to the USB host interface. Insert the USB cover into the tab of the USB holder:</p>  <p>The diagram shows a perspective view of the same device. A slot on the left is labeled "USB Holder". A "USB Cover" is shown being inserted into this slot. A black arrow points from the "USB Cover" towards the "USB Holder", indicating the direction of insertion. Labels "USB Holder" and "USB Cover" point to their respective components.</p>

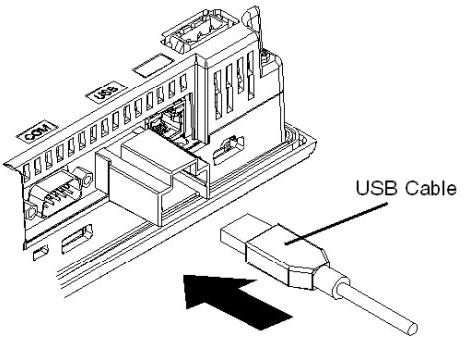
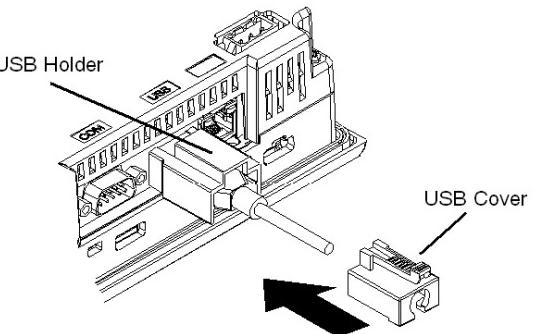
Important: Insert the USB cover in the orientation shown in the illustration above.

XBT GC2000 Series: USB Cable Clamp

Attachment

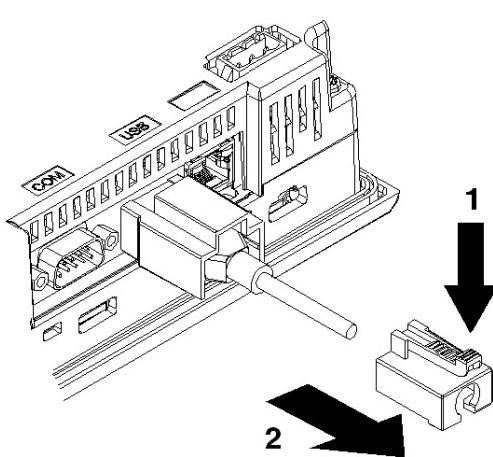
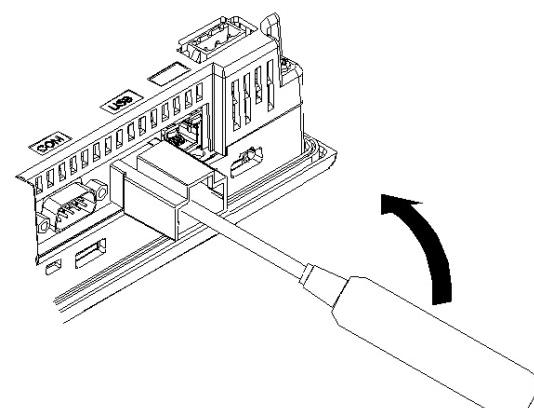
Procedure:

Step	Action
1	<p>Before starting the procedure, pull out the USB cover from the USB holder by holding the top and bottom of the USB holder and pressing down the tab on the USB cover:</p> 
2	<p>With the main unit display part positioned so that it is facing down, attach the USB holder to the USB host interface. Insert the picks on the top of the USB holder into the attachment holes on the main unit, then insert the holder into the USB host interface so that the holder is secured in the main unit:</p> 

Step	Action
3	<p>Insert the USB cable into the USB Host Interface:</p>  <p>The diagram shows a side-view cross-section of a printed circuit board (PCB). A vertical slot labeled "USB" is visible. A black arrow points from a separate USB cable towards this slot, indicating the direction of insertion.</p>
4	<p>Attach the USB cover to the USB host interface. Hold the USB cover in the orientation shown in the figure and insert it into the USB holder:</p>  <p>The diagram shows a side-view cross-section of a PCB. A horizontal slot labeled "USB Holder" is attached to the board. A black arrow points from a separate USB cover towards this holder, indicating the direction of insertion. The USB cover is shown with its pins facing downwards, matching the orientation required for the holder.</p> <p>Important: Insert the USB cover in the orientation shown in the illustration above.</p>

Removal

Procedure:

Step	Action
1	Pull out the USB cover from the USB holder by pressing down the tab on the USB cover: 
2	Insert the tip of a flat-blade screwdriver into the hole on the bottom of the USB holder and raise the handle so that the USB holder detaches from the USB host interface: 

Maintenance

5

Introduction

This chapter explains the precautions and inspection criteria that the XBT GC requires.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Cleaning the Display	116
Periodic Check Points	117
Replacing the Installation Gasket	118
Replacing the Backlight	121

Cleaning the Display

Recommendations

When the surface or frame of the display become dirty, soak a soft cloth in water with a neutral detergent, wring the cloth tightly and wipe the display.

CAUTION

IMPROPER EQUIPMENT CARE

- Do not use paint thinner, organic solvents or a strong acid compound to clean the unit.
- Do not use hard or pointed objects to operate the touch-screen panel, since it can damage the panel surface.

Failure to follow these instructions can result in injury or equipment damage.

Periodic Check Points

Introduction

To keep your XBT GC unit in its best condition, please inspect the following points periodically.

Operation Environment

- Is the operating temperature within the allowable range (0°C to 50°C)(32 to 122°F)?
- Is the operating humidity within the specified range (10%RH to 90%RH, dry bulb temperature of 39°C (102.2°F) or less)?
- Is the operating atmosphere free of corrosive gasses?

When using the XBT GC unit inside a panel, the ambient environment refers to the interior of the panel.

Electrical Specifications

Is the input voltage appropriate?

19.2...28.8 VDC

Related Items

- Are all power cords and cables connected properly? Have any become loose?
- Are all mounting brackets holding the unit securely?
- Are there many scratches or traces of dirt on the installation gasket?

Replacing the Installation Gasket

Presentation

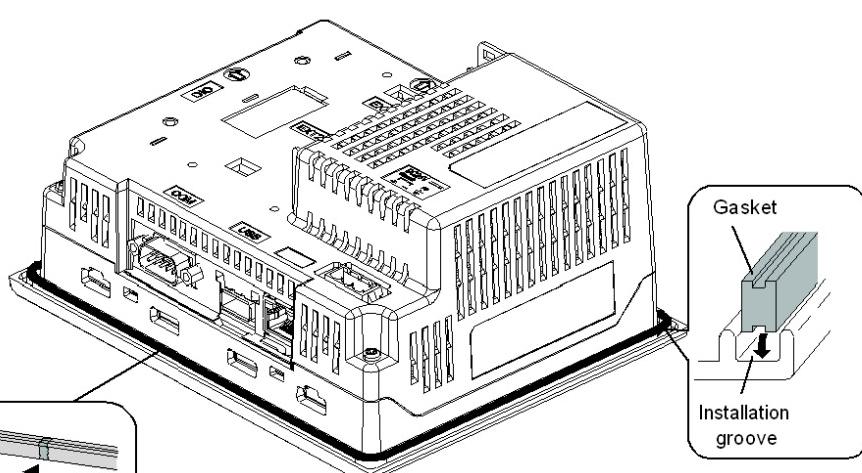
The installation gasket provides protection against dust and moisture.

Important:

- A gasket which has been used for a long period of time may have scratches or dirt on it and could have lost much of its water resistance. Be sure to change the gasket at least once a year, or when scratches or dirt become visible.
- The XBT GC unit installation gasket's model number is as follows.

Model	Reference
XBT GC1000 Series	XBT ZG51
XBT GC2000 Series	XBT ZG52

Installation Gasket Attachment Procedure

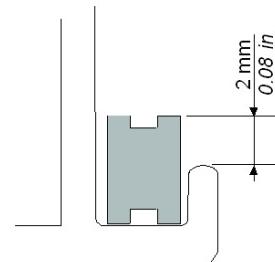
Step	Description
1	Place the XBT GC on a flat, level surface facing the display face downwards.
2	Remove the gasket from the XBT GC.
3	Attach the new gasket to the XBT GC. Be sure to insert the gasket into the XBT GC's groove so that the gasket's groove sides are vertical. 
4	Check that the gasket is attached correctly to the XBT GC.

⚠ CAUTION

WATER OR DUST DAMAGE

- The gasket must be inserted correctly into the groove for the XBT GC's moisture resistance to be equivalent to IP65.
- Since the gasket is flexible but not elastic, be careful not to stretch it unnecessarily, as doing so could tear the gasket.
- Be sure the gasket's seam is not inserted into any of the unit's corners, only in the straight sections of the groove. Inserting it into a corner may lead to its eventually tearing.
- To ensure stable resistance against dust and moisture, insert the gasket so that the seam is at the bottom of the XBT GC unit.
- The upper surface of the gasket should protrude approximately 2.0 mm (0.08 in) out from the groove. Be sure to check that the gasket is correctly inserted before installing the XBT GC into a panel.

Failure to follow these instructions can result in injury or equipment damage.



Replacing the Backlight

Important Notice

The XBT GC's backlight cannot be replaced by the user. When the backlight needs to be replaced, please contact your local distributor.

